Ontario

ENVIRONMENTAL MANAGEMENT SYSTEMS

GUIDE TO ISO 14001 Implementation in the Municipal Waste Management Sector

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Ministry of the Environment

Guide To ISO 14001 Implementation in the Municipal Waste Management Sector

A joint publication of:

The Ontario Ministry of the Environment
CSR: Corporations Supporting Recycling
Environment and Plastics Industry Council
The City of London
The Town of Markham
The Region of Peel

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Notes:

(1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*

(2) *Although the intended primary application of this Publication is stated in its Scope, it is important to note that it remains the responsibility of the users of the Publication to judge its suitability for their particular purpose.*

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PREFACE

Environmental management systems (EMS) should help a municipal waste management (MWM) facility enhance its environmental performance while improving its productivity, operational efficiency and community and business relations. This Guide was developed specifically to assist operators and managers of MWM sites in learning to implement and manage in a practical and cost effective manner environmental management systems based on the ISO 14001 standard. It is particularly suited to the needs of small and medium sized facilities in identifying and addressing their environmental challenges since the authors divide up the MWM process into component unit operations ranging from collection to final disposal. It provides EMS guidance in various handling and treatment areas that are generic to most MWM facilities.

Advance draft copies of the Guide were discussed at focus group workshops attended by several municipal staff involved in MWM activities. Their comments along with those from experienced practitioners of ISO 14000 EMS from KPMG and Waterloo and Hamilton-Wentworth regional municipalities were incorporated in the final text of the Guide. Our goal has been to prepare a state-of-the-art guidance document that draws upon the experience of knowledge people in its field. Compared to other ISO 14000 publications, this Guide has the following unique features:

- Answers in a simple language some of the commonly asked questions about ISO 14000, such as staff and budget requirements for training, set up and maintenance of the EMS and why and how a municipality or a town should establish an EMS for its facilities.

- Provides a useful training and learning tool comprising of hands-on work book type format, flow diagrams of major unit operations in a MWM facility, and easy to follow checklists to identify and analyze gaps, aspects and impacts and other key system elements.

- Includes practical examples of various EMS elements and procedures drawn from the experience of ISO 14001 registrants, such as environmental policy, legal requirements, objectives and targets, procedures for training, internal communications, hazard reporting, document control and record management.

- Builds on a municipality's existing EMS and experience with best general management practices.

- Includes a listing of sources of other useful information and how to access it.

- Includes two case studies which describe planning and implementation work that needs to be done to achieve ISO 14001 registration by MWM facilities implement along with associated actual and projected costs.

- There is included description a life cycle inventory model for **Integrated Waste Management** for municipalities and how this model can be incorporated in an ISO 14001 strategy to achieve resource conservation and environmental benefits.

- Can be used as a first-step introductory guide or a source of references for more advanced learning and ISO 14001 implementation for self-declaration. The user has a choice; do it yourself, get involved in a group learning arrangement under a common and shared instructor, or if required get external help. It informs the user where to get professional help for speedy implementation and how to make use of services of an external consultant in the most cost-effective manner.

- Refers to considerations of further advancements in the development of EMS to include stakeholders input, public reporting, setting and evaluating environmental performance indicators which go beyond legislative compliance, and integration with occupational health and safety systems.

Benefits to Municipalities of Implementing ISO 14000 EMS for Their MWM Facilities

Following a successful pursuit of ISO 14001 implementation in many industrial sectors, there has developed a keen interest in ISO 14000 EMS among municipalities in North America.. The US EPA is promoting pioneering work in this regard. In June 1998, the Municipality of Waterloo in Ontario was the first Canadian municipal government to b awarded a ISO 14001 registration in its MWM services. Hamilton-Wentworth, under its Sustainable Community and Pollution Prevention Initiatives, has embarked on a similar project since 1997 for a number of its service deliver areas.

The ISO 14000 or an equivalent EMS will help a municipality identify opportunities for resource conservation, cost saving, efficiency and productivity; which in turn should improve the "bottom line " of its MWM facility. However, it is imperative that a cost-benefit analysis should be undertaken as a first step in order to make a business case for a potential ISO 14001 project. The case studies in this Guide give some idea of the costs; a quantification of ensuing environmental benefits would be a worthwhile challenge. For a municipality, the support of elected officials and public would also be desirable. The exercise of reviewing, analyzing, formulating and implementing environmental policies, procedure and practices required for an ISO 14000 registration will raise an

organization's awareness of the impact of its operations and policies on the environment and enhance its operational efficiency while helping to protect the environment. Some of the other benefits accruing from an ISO 14000 registration are:

- conforming with regulations is facilitated and the cost of compliance is reduced as potentially "risky" situations are recognized and corrected,
- annual reviews and audits render efficiency and productivity improvements an on-going dynamic exercise leading to continuous improvement,
- a municipality's environmental responsibility can be more easily demonstrated,
- an improvement in the quality, structure and delivery of municipal services
- a good corporate image and reputation with the public, community groups, taxpayers, bankers, insurance companies, and regulatory authorities are created,
- clear lines of environmental accountability and responsibility within a municipality's organization can be created.

This Ministry of the Environment (MOE) has sponsored the preparation of this guidance document in partnership with Companies Supporting Recycling (CSR), Environmental and Plastics Industry Council (EPIC), City of London, Region of Peel, and Town of Markham. We are pleased to publish and offer this ISO 14001 Guide, and believe it will add value to your organization as you work towards implementing an ISO 14001 based EMS. We welcome your input. To send your comments on this publication or to obtain a copy of this publication, please contact the MOE or CSR at the following addresses:

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Other Sectorial ISO 14000 Implementation Guides

Encouraging industries, businesses and municipalities to voluntarily institute ISO 14001 or equivalent EMS standards in their operations is one of MOE's approaches to environmental stewardship. The Environmental Partnership Branch (EPB) of the MOE, in partnership with industry and business associations and municipalities has developed a

limited number of sector specific ISO 14001 implementation guides to promote the adoption of responsible and effective environmental management systems by key industrial and commercial sectors in Ontario. These guides were found to be valuable and timely reference and training tools at group workshops organized by industry associations. Each guide has been prepared by an expert consultant with a useful input from other experts and focus groups of environmental staff and potential users from participating industry associations

Besides the MWM sector, other sectors for which ISO 14000 guides have been prepared or are being developed include Automotive parts Manufacturing, Metal Finishing, Auxiliary Processes, Vinyl Processing, Corrugated Paper Packaging, Office Buildings, Schools, Colleges and University Campuses, Hospitals, and Municipal Facilities. For further information on these

publications, please see under publications the MOE website: www.ene.gov.on.ca or contact the MOE, Public Information Center.

Acknowledgments

The Project Committee for this Guide comprised of the following persons: Parkash Mahant, MOE; Joseph Hruska, CSR: Cathy Circo, EPIC; Jay Stanford, City of London; Peter Veiga, Town of Markham; Jonathan Hicks, Region of Peel. The Guide's original authors were Ruksana Mirza, Karen Simpson and Beverly Porter of Envirosphere EMC Inc. Kim K. Kitagawa of Waterloo and Peter Dunn and Mark Bekkering provided valuable information for the case studies. The Project Committee, Avril Fisken of KPMG and Katy Altoft of CSA International reviewed the draft of the Guide and their comments contributed to its improvement. Photographs provided by CSR, Peel and Waterloo were used on the covers of the Guide. Frank Loconte of MOE's Communication Branch did the art work for the covers. To all these people we offer our sincere thanks.

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Ministry of the Environment
May 2000

EXECUTIVE SUMMARY

Background and Purpose

The Ontario Ministry of the Environment (MOE) in conjunction with partners from industry (CSR: Corporations Supporting Recycling and the Environment and Plastics Industry Council) and local government (City of London, Town of Markham and Region of Peel), has sponsored the development of this ISO 14001 Implementation Guide for municipal waste management operations.

The purpose of the Guide is to assist the waste management departments of Ontario municipalities to develop and implement environmental management systems (EMS) that meet the requirements of ISO 14001. The implementation of an EMS can potentially help municipalities to increase the efficiency of their operations, ensure compliance with regulatory requirements, build positive relations with the community and foster a culture of prevention of pollution.

This Guide provides the information and guidance that a municipality will require to implement ISO 14001 cost effectively. It has been developed in consultation with municipalities to ensure that it focuses on the priorities, realities and needs of this sector. The Guide provides direction on policy development; identifies common activities, aspects and impacts; provides sample objectives and targets; identifies typical training requirements; and contains a checklist to track progress.

Although each municipality is unique, it is hoped that every municipality will find information from parts of this guide that is helpful in establishing an Environmental Management System (EMS) applicable to its circumstances.

Highlights

The following are highlights of the topics covered in the Guide.

Key Benefits of ISO 14001 Implementation

The Guide discusses the key benefits of ISO 14001 implementation for a municipality. These benefits include:

- reduced costs for energy, material inputs and waste disposal;
- reduced environmental liability;

- assurance of good relationships with stakeholders;
- continuous improvement; and,
- improved environmental awareness within the municipality.

The Guide also discusses the barriers that municipalities and other organizations have encountered in the process of implementing ISO 14001. It is hoped that awareness of these barriers will help municipalities to target their implementation programs towards overcoming them.

Checklist for Conducting a Gap Analysis

A Gap Analysis should be conducted at the start of implementing ISO 14001 to determine the gap between the requirements of the standard and the current status of a facility. The Guide provides a checklist for conducting a gap analysis that results in the production of an action plan and schedule for ISO 14001 implementation.

Assistance in the Development of an Environmental Policy

The ISO 14001 standard has several specific requirements related to the content of the environmental policy. These requirements include a commitment to continual improvement, prevention of pollution, and compliance with environmental regulations. The guide provides a sample environmental policy that complies with the requirements of the standard.

Identification of Environmental Aspects for Common Waste Management Activities

Central to ISO 14001 is the identification of the environmental aspects and impacts that require to be managed. The waste management systems of all municipalities have some activities in common. The Guide identifies the environmental aspects and impacts associated with the major waste management processes, including waste collection, materials recovery, composting, energy recovery and landfilling.

Guidance in Assessing Significance of Environmental Aspects

The ISO 14001 standard requires that the identified environmental aspects be assessed in order to determine which have or can have a significant impact on the environment. As the standard does not stipulate the method for evaluating significance, guidance on some standard methods available for determining significance is provided in the Guide.

Assistance in Setting and Achieving Environmental Objectives

As part of the commitment to continuous improvement and prevention of pollution, the standard requires that:

- environmental objectives and targets be set,
- a management program be established to ensure that the objectives are met and,
- that the progress towards those goals be monitored.

The guide provides assistance in this area by giving examples of common objectives and targets and illustrating the use of a sample management program tool.

Environmental Performance Indicators (EPIs)

EPIs are a measure of an organization's environmental performance and are used to measure the progress towards achieving environmental objectives and targets. EPIs can be an important component of an effective EMS, since what gets measured in an organization, gets taken into account in decision making. The Guide discusses the use of EPIs in municipal waste management operations and provides examples of EPIs applicable to waste management activities.

Life Cycle Inventory Model for Integrated Waste Management (IWM Model)

The Guide describes the use of the IWM Model developed by CSR (Corporations Supporting Recycling) and EPIC (Environment and Plastics Industry Council) to quantify energy consumption and emissions released from waste management operations. The model quantifies emissions of greenhouse gases, smog precursors, acid gases, heavy metals and organic compounds from a user-specified combination of collection, transportation, recycling, composting, energy recovery, and landfilling activities. The Guide discusses the potential for using the results of the IWM model to develop EPIs for a municipality's waste management system.

Listing of Relevant Environmental Legislation

The standard requires that organizations have a procedure in place to identify and conform to relevant environmental legislation and that the facilities have access to copies

of applicable documents. The Guide provides a sample procedure, a listing of applicable legislation, and identifies methods for obtaining copies of legislation.

Identification of Environmental Training Needs

Training is a key component of the ISO 14001 standard. The guide provides a listing of legislated environmental training requirements (e.g. transportation of dangerous goods, fuel transfer, etc.), as well as those required under ISO 14001 (e.g. environmental awareness, emergency preparedness and response, etc.).

Overview of Registration Process

An organization can achieve conformance with ISO 14001 either through self-declaration or through third party registration. The majority of organizations that have implemented ISO 14001 to date have chosen the latter course, mainly because of the greater level of credibility associated with third party verification. The Guide contains an overview of the registration process to provide municipalities with an indication of the timing, resource requirements and possible outcomes of a registration audit.

Registration Hints

Throughout the Guide, the reader is provided with registration hints, which highlight the areas that an external registrar may focus upon during an audit of the EMS.

Implementation Strategy

In addition to this Guide, a stand alone Implementation Strategy that recommends next steps for promoting the development of ISO 14001 based environmental management systems by municipal waste management departments of municipalities has been developed. The recommendations include the validation of the Guide through its application at a partner municipality wishing to implement ISO 14001 and the development of ISO 14001 training workshops for municipal staff.

1.0 INTRODUCTION

1.1 Background/Purpose

The Ontario Ministry of the Environment (MOE) has, in partnership with industry (CSR: Corporations Supporting Recycling and the Environment and Plastics Industry Council) and local government (City of London, Town of Markham and Region of Peel), sponsored the development of this ISO 14001 Implementation Guide for municipal waste management operations.

The overall objective of the Guide is to assist the waste management departments of Ontario municipalities to develop and implement environmental management systems (EMS) that meet the requirements of the ISO 14001 standard. The implementation of an EMS can potentially help municipalities to increase the efficiency of their operations, ensure compliance with regulatory requirements, build positive relations with the community and foster a culture of prevention of pollution. This Guide provides the information and guidance that a municipality will require to implement ISO 14001 cost effectively. It has been developed in consultation with municipalities to ensure that it focuses on the priorities, realities and needs of this sector. The Guide takes into account the nature of municipal waste management responsibilities and the opportunities and challenges facng the municipal waste management division. It includes a description of the preparatory work that operators of municipal waste management programs and facilities have to do to understand and prepare in order to implement an ISO 14001 EMS.

The objective of this guide is to provide guidance on the implementation of an ISO 14001 consistent EMS with a view to assisting municipalities improve the environmental performance of their municipal waste management systems. Although the guide does provide some information on the typical third party registration process, the choice of whether or not to seek registration is left up to the individual municipality.

In addition to the funding partners, the regions of Waterloo and Hamilton who have first hand experience with the developmen/implementation of ISO 14001 have provided information for case studies and have reviewed the draft report to ensure that it was practical and implementable. The Region of Waterloo was the first municipality in Canada to achieve registration to ISO 14001 for its Waste Management Centre. The Region of Hamilton Wentworth expects to have its waste management operations registered to ISO 14001 in the near future.

1.2 Environmental Management Systems (EMS): Definitions

An EMS is an organized and formal approach to managing environmental issues within an organization. It provides a framework for establishing environmental goals and objectives, developing strategies for their achievement, and allocating resources to implement the strategies.

The development of an EMS for waste management systems requires a thorough understanding of waste management processes, their environmental and resource utilization implications, and the available measures for mitigating environmental impacts. These issues are addressed in detail in Sections 2.0 and 3.0 of this document.

1.3 ISO 14000: Definitions

ISO 14000 is a series of standards and guidelines that are being developed by the International Organization for Standardization (ISO) to provide organizations with a structure for environmental management. ISO standards are international voluntary standards developed through consensus among representatives from different countries, industries and other stakeholders. The ISO 14000 series include standards for:

- EMS (ISO 14001);
- environmental auditing (ISO 14010);
- environmental labeling (ISO 14020);
- environmental performance evaluation (EPE) (ISO 14030); and,
- life cycle assessment (ISO 14040).

The EMS standard ISO 14001 was the first standard in the series to be published (in 1996) and is the cornerstone of the ISO 14000 series. The standard is applicable to the activities, products or services of all organizations regardless of size or type and may be applied to the whole organization or to a specific part of the organization.

ISO 14001 establishes the core elements of an EMS based on a set of guiding principles. These principles require the organization to:

- develop an environmental policy which articulates the organization's commitments with respect to environmental performance;
- obtain support for environmental improvement at all levels of the organization;

- formulate a plan with well defined objectives and targets to achieve the commitments made in the environmental policy;
- implement the plan by allocating resources and defining responsibilities so as to ensure that the goals and objectives are met;
- measure, monitor and evaluate environmental performance; and
- review the management system at regular intervals with a view to continually improving it.

A number of the other standards in the series describe methodologies that can be used in the development and implementation of an EMS. The relationship of ISO 14001 with other standards in the series will be discussed further in Chapters 3 through 9.

An organization can achieve conformance with ISO 14001 either through self-declaration or through third party registration. The majority of organizations that have implemented ISO 14001 to date have chosen the latter course, mainly because of the greater level of credibility associated with third party verification. However, there may be circumstances whereby an organization may choose to self declare.

1.4 Structure/Scope of the Guide

Although the Guide attempts to be as comprehensive as possible it is recognized that each municipality is unique, and therefore, the information contained in the guide will likely need to be interpreted and applied to the specific activities of individual municipalities.

Section 2.0 of the guide describes the municipal waste management sector. The section discusses the structure of municipalities in Ontario and the range of waste management responsibilities assumed by municipalities. Waste management operations from waste generation to disposal are reviewed. The benefits to a municipality of implementing ISO 14001 are discussed together with the perceived barriers to ISO 14001 implementation. Priorities of the municipal waste management sector are articulated.

Sections 3.0 to 8.0 of the Guide are structured so as to follow the five key elements of an EMS as defined in ISO 14001, namely:

- Environmental Policy;
- Planning;
- Implementation;

- Checking and Corrective Action; and
- Management Review

Throughout the Guide "registration hints" are provided. The intent of this information is to provide the reader with some practical insights into what "third party" Registrars may focus on and/or expect to see implemented during the audit of the EMS.

Section 9 of the Guide provides a brief overview of the typical third party registration process.

Section 10 contains additional information that may be helpful to municipalities, including a list of environmental management software and guidance documents and references on prevention of pollution/environmental management.

Appendix A provides case studies of ISO 14001 implementation at two regional municipalities in Ontario.

Appendix B contains sample policies, procedures and schedules to assist municipalities in developing their EMS documentation.

Appendix C contains information on the use of a life cycle inventory model to calculate the quantity of energy consumed and emissions generated from waste management operations.

Appendix D describes a strategy for implementing an ISO 14001 standard by MWM facility, as instructed in this Guide. It also contains an outline of the *Life Cycle Inventory Model for Integrated Waste Management* and a marketing and business plan for the model.

2.0 SECTOR PROFILE

2.1 Background

Municipal waste management has evolved rapidly in Ontario over the past two decades. Most notably, there has been an increased focus on the importance of resource conservation, enhancing the quality of our environment and addressing community concerns on the impact of waste management processes on the environment. This has resulted in municipalities looking at new ways to reduce, reuse and recycle materials that at one time would have gone to landfill. Many municipalities have adopted the goal set by the Province of Ontario in 1989 of reducing the amount of waste sent for disposal, per capita, by 50%.

Among the initiatives that have taken place are curbside recycling programs, household hazardous waste depots, backyard composters, regional yard waste composting centres, kitchen waste composting, recycling facilities, material recovery facilities, wet-dry sorting facilities, transfer stations and energy from waste facilities. Most recently, there has been a trend toward the development of integrated waste management facilities whereby a number of operations, such as a landfill, a transfer station and a material recovery facility, are located in close proximity.

At the same time that this has been happening, many municipalities have prohibited open burning. At landfills, bans have been placed on accepting certain types of materials, such as construction and demolition waste. All of this has served to increase the pressure to find new ways to use and reuse materials that at one time would have been disposed.

CSR: Corporations Supporting Recycling, the Ontario Ministry of the Environment, the Association of Municipal Recycling Coordinators and the Recycling Council of Ontario reported that in 1998, 1,255,000 tonnes of materials were diverted from landfills. Specifically, these included:

- 777,000 tonnes of recyclables;
- 182,000 tonnes of organic materials through backyard composters;
- 290,000 tonnes of organic materials through central composting; and,
- 6,000 tonnes of household hazardous waste

Despite these activities, landfills are still integral to municipal waste management systems. It has been estimated that the total amount of waste disposed in 1998, most of it in landfills, was 6,600,000 tonnes.

2.2 Municipal Structure

Municipalities in Southern Ontario are organized into tiers. Regions and Counties are termed "upper tier" and are composed of a number of "lower tier" or "area" municipalities. Cities, Towns, Municipalities and Townships are all area municipalities. For example, the Region of Peel comprises the City of Brampton, the City of Mississauga and the Town of Caledon. The one exception to this is the City of Toronto, which does not have an upper tier.

Central and Northern Ontario is divided into eleven Districts, which include incorporated municipalities and unorganized areas. Districts generally do not have their own staff or offices and most are not mandated to take the same role as Regions and Counties in coordinating waste management programs. Such initiatives are undertaken by incorporated municipalities located within the Districts or by Service Boards. The one significant exception to this is the District of Muskoka.

While there is no one single model for waste management services that applies to all municipalities in Ontario, most incorporated municipalities, upper and lower tier, do offer waste management services. The services may be structured under an Environmental or Waste Management Division, which in turn may fall within a Public Works or Engineering Department in the municipal government structure.

Municipalities are directly responsible for the provision of waste management services to the residential sector. Wastes and recyclables generated by the industrial, commercial and institutional sector (IC&I) may be collected and processed either by the municipality or by the private sector.

2.3 Waste Management Services

The Ontario Municipal Act defines the authorities and responsibilities of municipalities with respect to waste management. While not mandated to do so, upper tier governments frequently take the responsibility for coordinating the waste management efforts of the

area municipalities by:

- leading the effort to find cost effective, efficient, environmentally responsible waste management services;
- providing education programs and giving support and innovative ideas to the public on waste reduction, reuse and recycling;
- coordinating the development and operation of diversion facilities, including transfer stations, composting facilities for yard wastes and kitchen wastes, neighbourhood recycling centres, household hazardous waste drop off centres, material recovery facilities and integrated waste facilities;
- assisting with the development of waste management strategies;
- suggesting waste diversion goals and targets;
- providing waste disposal facilities, such as regional landfills;
- identifying types of materials available and allowed for disposal at regional landfills;
- setting rates at regional landfills; and
- delivering overall recycling and waste reduction programs.

Although the division of responsibilities between lower and upper tier municipalities vary from place to place, lower tier or area municipalities often take responsibility for some of the following:

- garbage collection and transfer services through own system and/or contractors;
- determining the maximum number of garbage bags allowed at the curbside;
- fleet maintenance, if the municipality owns collection vehicles;
- household hazardous waste drop off centres and/or events;
- residential curbside recycling collection services through own system and/or contractors; and
- local programs such as the provision of backyard composters.

In some instances area municipalities may also take responsibility for:

- providing waste disposal services such as landfills through facilities that are either owned by the municipalities or by contractors;
- delivering composting and yard waste strategies; and
- providing household hazardous waste and recycling facilities.

Partnerships between different municipalities and between municipalities and the private sector are becoming increasingly common as municipalities throughout Ontario examine their options for delivering an acceptable level of service at an acceptable price. Under ISO 14001, the environmental policies and practices of these public and private sector partners should be considered.

2.4 Advantages of ISO 14001 Implementation

The discipline of adopting an EMS that meets the requirements of ISO 14001 has a number of advantages and benefits. These include, but are not limited to:

Reduced Costs and Efficient Use of Resources

A systematic examination of the environmental aspects and impacts of activities, products and services can lead to better services and more efficient waste management processes which can reduce costs by:

- modifying labour requirements, material and utility inputs;
- reducing the cost of compliance with environmental standards and existing regulations by lowering the probability of incidents which may attract charges and penalties; and
- improving relationships with residents, thereby making system changes easier and more efficient to implement.

Reduction of Liability

An effective environmental management program can reduce a municipality's environmental liability in two ways:

- by reducing the likelihood and/or occurrence of an environmental incident; and
- by providing a due diligence defense if charges are laid as a result of an environmental incident.

In Canada, most environmental offenses are "strict liability" offenses, which means that to lay charges, the Crown only needs to establish that the prohibited act occurred. The defense must establish that either the prohibited act did not occur or that the defendant took every reasonable precaution to avoid, prevent or minimize the prohibited act. An effective EMS, following the discipline of ISO 14001, provides objective evidence that the organization allocated resources and efforts to reduce the probability of occurrence of undesirable environmental incidents. Therefore, although implementing an EMS is not a guarantee against prosecution or conviction, it can be a key element of due diligence defense.

Improved Relationships with Stakeholders

Environmental issues are broad in appeal and interest and many stakeholders and community groups perceive themselves affected by the way in which a municipality conducts its waste management operations. Stakeholders include:

- elected municipal politicians;
- taxpayers;
- suppliers and contractors;
- provincial and federal government agencies;
- employees;
- customers;
- community; and,
- insurance companies

An ISO 14001 consistent EMS will assist a municipality to demonstrate responsible environmental management. The existence of an EMS, the information it produces, and the attention it demands will assist the municipality communicate more effectively with stakeholders and the general public.

Mechanism for Continuous Improvement

ISO 14001 provides a mechanism for continuously improving the quality of the EMS and thereby improving the environmental performance of a municipality. It is a dynamic process, which is continually reviewed and revised - as goals and objectives are achieved, new ones are set. Thus an ISO 14001 consistent EMS acts as a driver for continuous improvement.

Improved environmental awareness within the municipality

The process of implementing an EMS can help create a better understanding of environmental issues and higher level of involvement for employees in all the operating units of the municipal waste management system. This can lead to the identification of relatively simple measures (many of which relate to housekeeping) that improve environmental performance. Improved performance in turn provides employees with a sense of achievement that contributes to high morale and a better workplace environment.

2.5 Perceived Barriers to ISO 14001 Implementation

The following is a discussion of some of the barriers to implementing ISO 14001:

Commitment from Top Management

Lack of general top management commitment is a significant barrier to the development of an EMS in any organization. In municipalities waste managers must obtain approval for projects from council which consists of elected officials. In order to obtain approval they must provide a clear business case, outlining the costs, benefits and time frame for implementation/registration. It is hoped that this guide will assist waste managers to identify the scope of work and level of effort required for implementing ISO 14001.

Changing Organizational Mindsets

The implementation of an effective EMS requires a fundamental change in the way that environmental issues are handled within an organization. It requires that environmental

issues be managed proactively rather than reactively. There is a need to identify both actual and potential environmental aspects and to act to mitigate them. While the majority of organizations do not question the need to address environmental issues after an incident (such as non-compliance, complaints, etc) occurs, it is often more difficult to convince management to take action to ensure that environmental incidents do not occur in the first place.

In addition, for an EMS to be effective, every employee must have a clear understanding of the environmental issues related to his job, the environmental consequences of his actions and ways in which to mitigate these consequences. This makes environmental performance the responsibility of every employee, which is a shift from the traditional approach whereby environmental issues were seen to be the responsibility only of the environmental department.

Lack of Public Awareness

Taxpayers can be viewed as the clients/customers of a municipal waste management system. In the private sector, there are now many examples of companies that have committed themselves to implementing an EMS and, in some cases, to obtaining registration to ISO 14001 in order to meet the requirements of major customers. A lack of awareness of the benefits of implementing an EMS among the general public means that this incentive to implement ISO 14001 often does not exist for municipalities making the task of obtaining approval from elected officials more difficult. A municipality can overcome this barrier through better communication with the public to demonstrate how an EMS can be a vehicle for improving environmental performance thereby improving the quality of life within the community and contributing to addressing global environmental issues (e.g. climate change).

Lack of Resources

A lack of resources (financial, human, and expertise) to implement an EMS is a commonly encountered barrier to implementation. Although in the long run an EMS may reduce costs, the initial setting up of the system requires additional personnel and resources. By providing guidance on the requirements of implementing ISO 14001, this guide will assist municipal staff in developing a convincing business case and thereby obtain access to the necessary resources.

2.6 Impact of ISO 14001 on Sector Priorities

Municipal waste managers are generally charged with the responsibility of providing waste management services to residents (and sometimes businesses), in a manner that is:

- protective of the environment;
- cost effective;
- acceptable to the residents of the municipality; and
- approved by elected municipal officials.

As municipal waste managers strive to implement waste management systems that are both cost-effective and protective of the environment, the need for a structured system within which the environmental challenges of waste management operations can be examined and managed is becoming increasingly recognized. With the pressure to reduce costs, programs that were set up because they were perceived to be 'good for the environment' are being re-examined. Increasingly, municipalities are expected to produce the environmental and business rationale for their choice of waste management systems. The implementation of ISO 14001 with its emphasis on continuous improvement and cost effective environmental protection will give municipalities the knowledge, understanding and resources to better respond to these challenges. Furthermore, an ISO 14001 EMS will provide municipalities with a system for prioritizing the myriad of environmental issues associated with waste management and implementing preventative measures.

Public acceptance has always played a major role in the design of waste management systems, from the siting of landfills, to the addition of materials to curbside recycling programs. Formal procedures for communication with external stakeholders, such as environmental advocacy groups, developed as part of an ISO 14001 EMS can help improve communication with local residents and serve to reassure them that waste management decisions are based on sound environmental considerations.

3.0 GETTING STARTED - ESTABLISHING YOUR BASELINE

3.1 Definitions of Key ISO 14001 Terms

The following is a listing of key terms and definitions used in ISO 14001. Additional definitions are available in ISO 14004 Guidance Document. Note that the text in italics gives the definitions provided in ISO 14001, ISO 14004 or ISO 14031.

environmental aspect *an element of an organization's activities, products, or services that can interact with the environment.* Examples of aspects include air emissions, wastewater effluents, solid wastes, potential for spills, consumption of resources, etc.

environmental impact *any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services.* Examples of impacts include air pollution, groundwater or soil contamination, resource depletion, habitat destruction, disruption of wildlife, and nuisance (odours, noise and vibrations).

environmental performance evaluation ("EPE") *is the process to facilitate management decisions regarding an organization's environmental performance by selecting indicators, collecting and analyzing data, assessing information against environmental performance criteria, reporting and communicating, and periodic review and improvement of this process.* An EPE is an ongoing collection / assessment of data to provide a current evaluation of performance trends. It provides management with reliable and verifiable information on an ongoing basis.

environmental performance indicators ("EPIs") *is a specific expression that provides information about an organization's environmental performance.* A key element of an EPE is establishing EPIs or performance measures that will be used in the evaluation process. The basic premise is what gets measured gets done, thereby allowing an organization to more clearly understand and quantify where it is and how far it has to go to meet its environmental goals / objectives / targets.

prevention of pollution *- use of processes, practices, materials or products that avoid, reduce or control pollution, which may include recycling, treatment, process changes, control mechanisms, efficient use of resources and material substitution.*

3.2 Steps to Implementation

Figure 3.1 presents an overview of the ISO 14001 EMS implementation process. This section addresses the first two steps: obtaining senior management commitment; and, conducting an initial benchmark assessment or gap analysis to establish your current EMS status.

3.2.1 Obtaining Top Management Commitment

Top management commitment is a key requirement of ISO 14001 and is essential to its success. Top management must also have a clear understanding of the benefits of an EMS and the resources that are required to establish an EMS. Top management would typically include the individual or group of individuals with executive responsibility for the waste management system. The efforts made by the municipal waste management division to implement ISO 14001 will likely be taken more seriously by middle management and operating personnel when it is clear that the system has the *sustained attention* and committed support from Top Management. Top management can demonstrate its support for in-house EMS initiatives by communicating to employees and the public its expectations of the municipality's environmental performance. Top management should also make it clear what it expects from its employees at all levels.

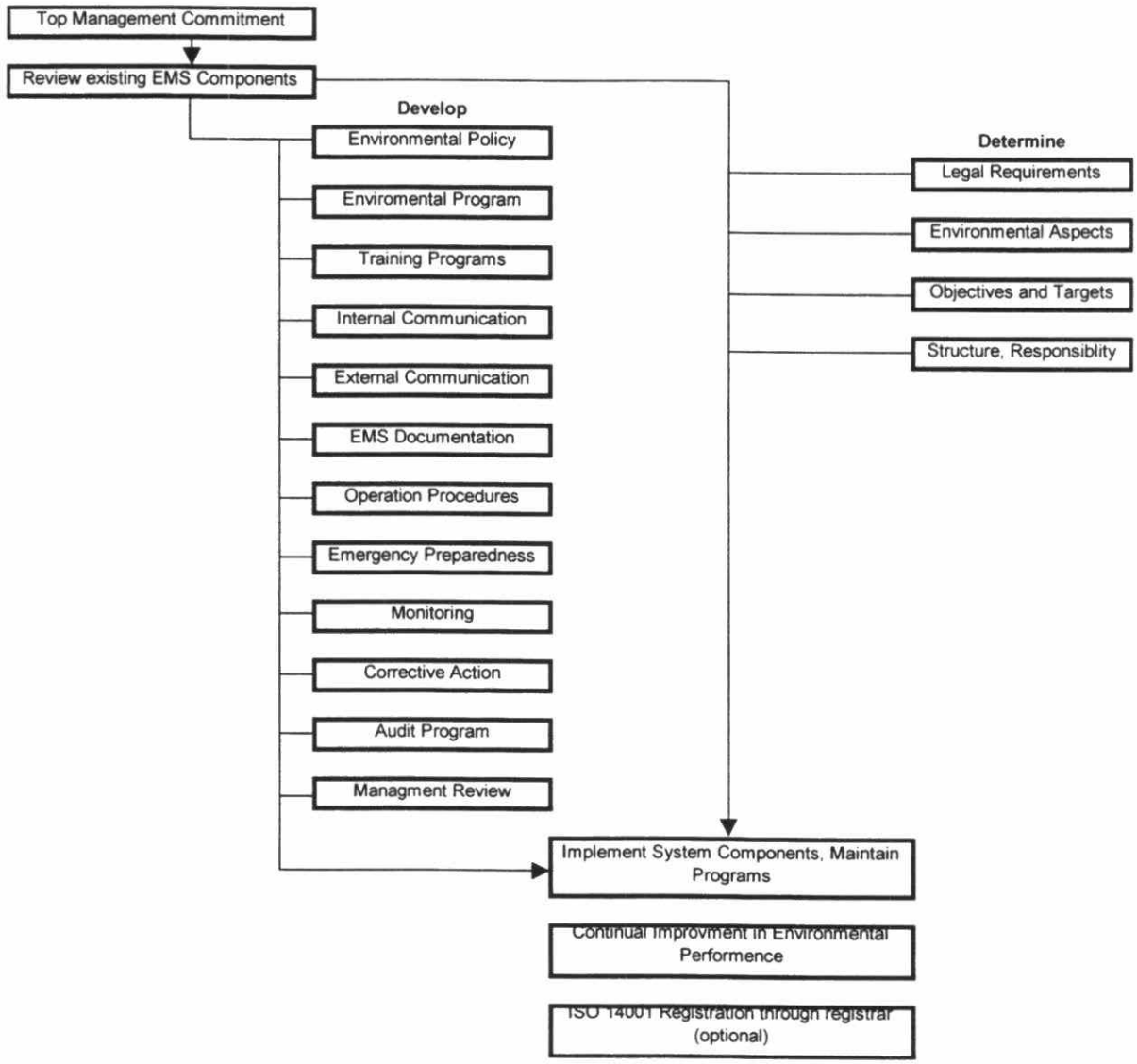
Top management should appoint a person(s) responsible for the developing and coordinating and action plan and timetable for implementing ISO 14001.

3.2.2 Review Existing EMS Components (Gap Analysis)

As shown in Figure 3.1 a review of existing EMS components is one of the first steps in the development of an EMS. This review is known as a Gap Analysis or Initial Benchmark Assessment. The purpose of a Gap Analysis is to identify the "gaps" between the requirements of the ISO 14001 standard and the current practices and procedures of the municipality. A Gap Analysis allows the municipality to develop a work plan that identifies the specific tasks that are required to be undertaken in order to achieve compliance with ISO 14001.

- Activities associated with a Gap Analysis include document review, interviews with personnel (including contractors), and facility inspections. The Gap Analysis should (at minimum) cover the following four areas:

Figure 3.1: Overview of the ISO 14001 Implementation Process



- legislative (e.g. municipal, provincial and federal) and other regulatory requirements (e.g. industry codes of practice, agreements with public authorities, and non-regulatory guidelines);

- identification of significant environmental aspects and evaluation of associated environmental impacts (e.g. emissions to air, releases to water, waste management practices, contamination / use of land, packaging, use of raw materials and natural resources, fuel management, and other local environmental and community issues);

- examination of all existing environmental management practices and procedures (including on-site personnel's specific job descriptions and requirements, as well as procedures to make employees and contractor's aware of in-house environmental policy); and

- evaluation of feedback from the investigation of previous environmental incidents (where applicable).

As an example, one of the requirements of ISO 14001 is that an organization have an environmental policy that contains specific commitments to the environment. For a municipality with an existing environmental policy in place, as part of the Gap Analysis the following tasks would be undertaken:

- the environmental policy would be compared to the requirements of ISO 14001;
- the deficiencies would be noted; and
- an action plan to address the deficiencies would be developed.

The Gap Analysis can be performed either by in-house staff or external consultants. Whoever is selected to complete this task, it is important that they are knowledgeable about ISO 14001 and EMS in general. A Gap Analysis report should be prepared that summarizes the current EMS status with respect to ISO 14001 requirements. The following information should be summarized in the report:

- approach for conducting the gap analysis;

- findings of the Gap Analysis (organized in accordance with ISO 14001 clauses);

- discussion on where the municipality does not conform and/or goes beyond conformance requirements;

- specific action items required to address deficiencies (if specific action items are not able to be provided, a general description of what needs to be completed to address deficiencies should be provided); and

- estimated level of effort (resources, staff time, cost, consulting services) required to fill the noted gaps.

The findings of the Gap Analysis should be presented to Top Management, as well as a review of the implementation plan. The implementation plan should include, but not be limited to:

- procedures and requirements that must be in place to conform to ISO 14001;
- schedule of milestones, action items and resources required to accomplish EMS goals;
- clear definitions of roles and responsibilities of in-house personnel in developing various parts of the implementation process; and
- communications strategy to integrate cross-functional organizational elements into the EMS.

It should be noted that a number of ISO 14001 software development companies have introduced software specifically designed to facilitate the gap analysis. A few examples of software development companies are provided in Section 10.2 of the Guide.

3.2.3 Checklist for Gap Analysis and Action Plan Development

Table 3.1 contains a "Checklist for Gap Analysis and Action Plan Development". By completing this checklist, a municipality can develop a facility specific work plan for the implementation of ISO 14001.

3.2.4 Typical Implementation Schedule

Implementing ISO 14001 typically takes between 8 months and 14 months. A sample schedule, including the major tasks, is provided in Table 3.2. This schedule is based on an implementation period of one year. It is recommended that the schedule be used to estimate and track the cost associated with the implementation of each activity and of the plan in aggregate. This will the municipality in maintaining the accountability of the EMS team.

3.2.5. ISO 14001 Implementation as a Business Project

It is highly recommended that the ISO 14001 implementation should be run as a "business " project with quantified costs , verifiable benefits and acceptable return on investment. Environmental improvements could be deemed to be tangible benefits.

TABLE 3.1
CHECKLIST FOR GAP ANALYSIS AND ACTION PLAN DEVELOPMENT

REQUIREMENT	YES/NO	ACTION ITEM IF ANSWER IS NO	P
4.2 Environmental Policy			
1. Does the Municipality have an environmental policy? *If your Municipality does not have an environmental policy skip to question 10.*	☐ Yes ☐ No	Develop an environmental policy that conforms to the ISO 14001 standard (Element 4.2).	
2. Does the policy reference your activities, products, or services?	☐ Yes ☐ No	Revise policy to ensure it is appropriate to the nature, scale and environmental impacts of the Municipality's activities, products, and services.	
3. Does the policy include a commitment to continual improvement and prevention of pollution?	☐ Yes ☐ No	Revise policy to ensure it includes a commitment to continual improvement and prevention of pollution.	
4. Does the policy include a commitment to comply with relevant laws or other requirements?	☐ Yes ☐ No	Revise policy to ensure it includes a commitment to comply with relevant environmental laws and or other requirements.	
5. Does the policy include a framework for setting and reviewing environmental objectives and targets? Set objectives and targets at a level that challenges the Municipality, but are realistic and achievable. Ensure that objectives and targets are measurable so that (regular) progress can be tracked.	☐ Yes ☐ No	Revise policy to ensure it includes a framework for setting and reviewing environmental objectives and targets.	
6. Is the policy implemented and conformed to?	☐ Yes ☐ No	Review policy and identify areas of non-conformance and implement methods for resolution.	
7. Is the policy communicated to employees?	☐ Yes ☐ No	Develop a plan to communicate the environmental policy to the employees.	
8. Is the policy available to the public?	☐ Yes ☐ No	Make the environmental policy available to the public.	
9. Is the environmental policy signed by senior management? Although the Standard does not specifically request that the policy be signed-off by senior management, this is certainly good practice.	☐ Yes ☐ No	Ensure that the environmental policy is signed and endorsed by the most senior managers..	
10. Have you answered Yes to all the above questions?	☐ Yes ☐ No	Assign a person(s) to revise the environmental policy.	

TABLE 3.1
CHECKLIST FOR GAP ANALYSIS AND ACTION PLAN DEVELOPMENT (Cont'd)

REQUIREMENT	YES/NO	ACTION ITEM IF ANSWER IS NO	PAGE
4.3.1 Environmental Aspects			41
1. Has the Municipality identified the environmental aspects (air emissions, wastewater, waste generation, etc.) that it controls and over which it can be expected to have influence?	☐ Yes ☐ No	Identify environmental aspects for the activities, products and services that the Municipality conducts or provides.	
2. Does the Municipality have a formal procedure for identifying and reviewing the environmental aspects and evaluating their significance?	☐ Yes ☐ No	Develop a formal procedure for assessing significance of the environmental aspects identified.	
3. Does the procedure for environmental aspects ensure that the information on aspects is kept up-to-date?	☐ Yes ☐ No	Include in the procedure a mechanism for ensuring that environmental aspects are kept up-to-date.	
3. Have you answered Yes to all the above questions?	☐ Yes ☐ No	Assign a person(s) to address environmental aspects and conformance with section 4.3.1 of the ISO 14001 standard.	
4.3.2 Legal and Other Requirements			52
1. Does the Municipality have a formal procedure in place to ensure that legal and other requirements for environmental performance applicable to the environmental aspects of the Municipality's activities, products and services are identified?	☐ Yes ☐ No	Develop a formal procedure for ensuring that legal and other requirements for environmental performance are identified and kept up-to-date.	
2. Does the Municipality have copies or have access to relevant environmental legislation and other requirements?	☐ Yes ☐ No	Obtain copies of and arrange for access to relevant environmental legislation and documentation for other requirements.	
3. Have you answered Yes to all the above questions?	☐ Yes ☐ No	Assign a person(s) to address the legal and other requirements and conformance with section 4.3.2 of the ISO 14001 standard.	

TABLE 3.1
CHECKLIST FOR GAP ANALYSIS AND ACTION PLAN DEVELOPMENT (Cont'd)

REQUIREMENT	YES/NO	ACTION ITEM IF ANSWER IS NO	PAGE
4.3.3 Objectives and Targets			57
1. Does the Municipality have environmental objectives and targets?	☐ Yes ☐ No	Set environmental objectives and targets.	
2. If yes, are the environmental objectives and targets set taking into account the significant environmental aspects, legal requirements, technological options, financial considerations, third party interests, the Municipality'senvironmental policy, and prevention of pollution?	☐ Yes ☐ No	Review the method for setting environmental objectives and targets to ensure that they conform to section 4.3.3 of the ISO 14001 standard.	
3. Have you answered Yes to all the above questions?	☐ Yes ☐ No	Assign a person(s) to address objectives and targets and conformance with section 4.3.3 of the ISO 14001 standard.	
4.3.4 Environmental Management Program			62
1. Does the Municipality have a program in place to ensure it achieves its environmental objectives and targets? *If your Municipality does not have environmental objectives and targets skip to question 4.*	☐ Yes ☐ No	Establish an Environmental Management Program that conforms to section 4.3.4 of the ISO 14001 standard.	
2. Does the Municipality have a program in place that designates responsibility for achieving its environmental objectives and targets?	☐ Yes ☐ No	Assign responsibility for achieving environmental objectives and targets.	
3. Does the Municipality have a program in place that sets out the time frame and the procedures by which environmental objectives and targets are to be met?	☐ Yes ☐ No	Implement a program to determine when and how environmental objectives and targets are to be met.	
4. Is the environmental management program amended to take into account new projectsor modified activities?	☐ Yes ☐ No	Include in the environmental management program a mechanism for incorporating new projects.	
5. Have you answered Yes to all the above questions?	☐ Yes ☐ No	Assign a person(s) to address objectives and targets and conformance with section 4.3.4 of the ISO 14001 standard.	

REQUIREMENT	YES/NO	ACTION ITEM IF ANSWER IS NO	PAGE
4.4.1 Structure and Responsibility			65
1. Does the Municipality have defined, documented and communicated roles for environmental management?	☐ Yes ☐ No	Establish an environmental management structure in accordance with Section 4.4.1 of the ISO 14001 standard	
2. Does management ensure that there are sufficient resources (human resources, technical skills, and financial resources) to implement an environmental management system?	☐ Yes ☐ No	Obtain management commitment for additional resources.	
3. Are specific management representatives assigned responsibility for ensuring the EMS requirements are implemented and for reporting on the system to top management?	☐ Yes ☐ No	Assign management responsibilities for ensuring the EMS requirements are implemented and for reporting on the system to top management.	
4. Have you answered Yes to all the above questions?	☐ Yes ☐ No	Assign a person(s) to address the Municipality's environmental management structure and conformance with section 4.4.4 of the ISO 14001 standard.	
4.4.2 Training, Awareness and Competence			67
1. Does the Municipality have a formal procedure in place to ensure that training needs are identified?	☐ Yes ☐ No	Develop a procedure to determine environmental training requirements, deliver required training, and track training requirements.	
2. Have all personnel whose work may create a significant impact upon the environment, received the appropriate training and are they competent?	☐ Yes ☐ No	As part of the training program, ensure that all personnel who may create a significant impact upon the environment have received the appropriate training and are competent.	
3. Are all personnel aware of the importance of conforming to the environmental policy, their roles and responsibilities, the significant impacts their work might cause , the consequences of departure from specified operating procedures, and the action required in case of an emergency situation?	☐ Yes ☐ No	As part of the training program, ensure that all personnel are aware of the importance of conforming to the environmental policy, their roles and responsibilities, and the significant impacts that their work might cause.	
4. Have you answered Yes to all the above questions?	☐ Yes ☐ No	Assign a person(s) to address training, awareness and competence and conformance with section 4.4.2 of the ISO 14001 standard.	

TABLE 3.1
CHECKLIST FOR GAP ANALYSIS AND ACTION PLAN DEVELOPMENT (Cont'd)

REQUIREMENT	YES/NO	ACTION ITEM IF ANSWER IS NO	PAGE
4.4.3 Communication			70
1. Does the Municipality have a formal procedure in place for internal communication of environmental information between the various levels and functions of the organization?	☐ Yes ☐ No	Develop a formal procedure to communicate environmental information within the Municipality.	
2. Does the Municipality have a formal procedure in place for receiving, responding to, and documenting external communication relating to environmental issues at the Municipality?	☐ Yes ☐ No	Develop a formal procedure to address communication of environmental information with sources external to the Municipality.	
3. Has the municipality considered the processes for external communication on its SEA and recorded this decision?	☐ Yes ☐ No	Develop a procedure to determine and record the processes for external communication on its SEA.	
4. Have you answered Yes to all the above questions?	☐ Yes ☐ No	Assign a person(s) to address communication and conformance with section 4.4.3 of the ISO 14001 standard.	
4.4.4 Environmental Management System Documentation			73
1. Does the Municipality maintain documentation on the Environmental Management System that describes the core elements and the location of related documentation?	☐ Yes ☐ No	Assign a person(s) to address EMS documentation and conformance with section 4.4.4 of the ISO 14001 standard.	

TABLE 3.1
CHECKLIST FOR GAP ANALYSIS AND ACTION PLAN DEVELOPMENT (Cont'd)

REQUIREMENT	YES/NO	ACTION ITEM IF ANSWER IS NO	PAGE
4.4.5 Document Control			75
1. Does the Municipality have a procedure for controlling environmentally related documents (i.e. Certificates of Approval, MSDS, etc.)? *If your Municipality does not have a procedure for document control skip to question 4.*	☐ Yes ☐ No	Develop a formal procedure to address document control of environmental information within the Municipality.	
2. Does the procedure address where the documents are located, the mechanism for reviewing, approving, keeping the documents current, and identifying obsolete documents?	☐ Yes ☐ No	Modify the existing procedure to ensure all the requirements of the standard are addressed.	
3. Is the documentation legible, dated, readily identifiable, maintained in an orderly manner, and retained for a specified period?	☐ Yes ☐ No	Modify the existing procedure to ensure all the requirements of the standard are addressed.	
4. Have you answered Yes to all the above questions?	☐ Yes ☐ No	Assign a person(s) to address document control and conformance with section 4.4.5 of the ISO 14001 standard.	
4.4.6 Operational Control			77
1. Has the Municipality identified operations or activities that are associated with significant environmental aspects (i.e. operations with significant air emissions, waste water discharge, etc.)?	☐ Yes ☐ No	In conjunction with section 4.3.1 of the standard (environmental aspects), identify operations that have significant environmental aspects.	
2. Has the Municipality established and documented procedures for the identified activities and operations to minimize their potential impact on the environment (i.e. procedures to ensure pollution control equipment is in good repair, etc.)?	☐ Yes ☐ No	For the operations identified, develop procedures to minimize the environmental aspects.	
3. Do the procedures developed specify operating criteria?	☐ Yes ☐ No	Include operating criteria in the procedures.	

REQUIREMENT	YES/NO	ACTION ITEM IF ANSWER IS NO	PAGE
4. Does the Municipality have procedures to ensure that the significant aspects of goods and services used by the Municipality are identified, and requirements and relevant procedures are communicated to suppliers and contractors? This operational control is significant for Muncipalities given the large number of contractors involved in critical functions.	☐ Yes ☐ No	Establish procedures to identify significant aspects of goods and services used by the Municipality and communicate requirements to suppliers and contractors.	
5. Have you answered Yes to all the above questions?	☐ Yes ☐ No	Assign a person(s) to address operational control and conformance with section 4.4.6 of the ISO 14001 standard.	
4.4.7 Emergency Preparedness and Response			79
1. Has the Municipality identified potential environmental emergency scenarios (spills, fires, on-site wastewater treatment plant failure, etc.) and established emergency response procedures for them?	☐ Yes ☐ No	Identify potential environmental emergency scenarios and establish emergency response procedures.	
2. Has the Municipality identified potential associated environmental impacts and established procedures to prevent or mitigate their occurrence (i.e. installation of spill containment, designated chemical storage areas, etc.)?	☐ Yes ☐ No	Identify potential associated environmental impacts and establish emergency procedures to prevent or mitigate their occurrence.	
3. Are emergency procedures reviewed and revised when necessary, in particular, after an emergency incident?	☐ Yes ☐ No	Establish a procedure for reviewing emergency response procedures or include this requirement in the emergency response procedure.	
4. Are the emergency procedures tested where practicable.	☐ Yes ☐ No	Include in the procedure a mechanism for conducting testing of emergency procedures identifying the practicable frequency.	
5. Have you answered Yes to all the above questions?	☐ Yes ☐ No	Assign a person(s) to address emergency preparedness and response and conformance with section 4.4.7 of the ISO 14001 standard.	

TABLE 3.1
CHECKLIST FOR GAP ANALYSIS AND ACTION PLAN DEVELOPMENT (Cont'd)

REQUIREMENT	YES/NO	ACTION ITEM IF ANSWER IS NO	PAGE
4.5.1 Monitoring and Measurement			83
1. Does the Municipality have documented procedures to monitor or measure parameters of activities that can have a significant impact on the environment?	☐ Yes ☐ No	Review activities that have significant impacts and identify parameters that should be monitoring. Establish a procedure to monitor these parameters.	
2. Does the procedure include recording information to track performance, relevant operational controls and conformance with the Municipality's objectives and targets?	☐ Yes ☐ No	Include a requirement in the procedure to track performance related to the Municipality's objectives and targets.	
3. Is the monitoring equipment calibrated and maintained, and the records of calibration and maintenance documented?	☐ Yes ☐ No	Include a requirement in the procedure that equipment for monitoring be calibrated and maintained, and keep documented records of the maintenance.	
4. Does the Municipality have a procedure to compare results of monitoring with relevant environmental legislation and evaluate whether the required monitoring is being performed?	☐ Yes ☐ No	Include a requirement in the procedure that monitoring results be compared to environmental requirements.	
5. Have you answered Yes to all the above questions?	☐ Yes ☐ No	Assign a person(s) to address monitoring and measuring and conformance with section 4.5.1 of the ISO 14001 standard.	
4.5.2 Non-conformance and Corrective and Preventive Action			85
1. Does the Municipality have a procedure for defining responsibility and authority for handling and investigating nonconformance with environmental policies or procedures?	☐ Yes ☐ No	Develop a procedure to address non-conformance and corrective and preventive action.	
2. Does the Municipality have a procedure for incorporating the results of corrective action in the documented procedures.	☐ Yes ☐ No	Include in the nonconformance and corrective and preventive action a mechanism for updating relevant documentation.	
3. Have you answered Yes to the above question?	☐ Yes ☐ No	Assign a person(s) to address non-conformance and corrective and preventive action and conformance with section 4.5.2 of the ISO 14001 standard.	

TABLE 3.1
CHECKLIST FOR GAP ANALYSIS AND ACTION PLAN DEVELOPMENT (Cont'd)

REQUIREMENT	YES/NO	ACTION ITEM IF ANSWER IS NO	PAGE
4.5.3 Records			88
1. Has the Municipality identified the types of environmental records that are required?	☐ Yes ☐ No	Develop a list of records. These shall include training records, the results of audit and reviews, Certificates of Approval (Waste/Air), waste manifests, waste registration, etc.	
2. Does the Municipality have a procedure to ensure that environmental records are kept so that they can be readily located, are protected against loss, and are retained for an appropriate length of time?	☐ Yes ☐ No	Develop a procedure for the maintenance of environmental records.	
3. Are environmental records legible, identifiable and traceable to the activity, product or service involved or stored?	☐ Yes ☐ No	Include requirement in the procedure that records be legible, identifiable and traceable to the activity, product or service involved.	
4. Have you answered Yes to all the above questions?	☐ Yes ☐ No	Assign a person(s) to address environmental records and conformance with section 4.5.3 of the ISO 14001 standard.	
4.5.4 Environmental Management System Audit			89
1. Does the Municipality conduct periodic environmental management system audits?	☐ Yes ☐ No	Once the ISO 14001 EMS is in place, conduct periodic EMS audits.	
2. Does the Municipality have in place a procedure for conducting environmental management system audits that includes the audit scope, consideration of risk in establishing audit frequency, and the responsibility for conducting audits and reporting results?	☐ Yes ☐ No	Develop a procedure to ensure that EMS audits are conducted in a specified method.	
3. Have you answered Yes to all the above questions?	☐ Yes ☐ No	Assign a person(s) to address EMS audits and conformance with section 4.5.4 of the ISO 14001 standard.	

TABLE 3.1
CHECKLIST FOR GAP ANALYSIS AND ACTION PLAN DEVELOPMENT (Cont'd)

REQUIREMENT	YES/NO	ACTION ITEM IF ANSWER IS NO	PAGE
4.6 Management Review			92
1. Does senior management review the EMS at set intervals to ensure its suitability, effectiveness and adequacy?	☐ Yes ☐ No	Conduct regular documented reviews of the EMS from a management perspective. This review would include the environmental policy, audit results, performance related to objectives and targets, suitability of the EMS to changing conditions, and concerns of relevant interested parties.	
2. Is the information collected sufficient to allow the management review to take place?	☐ Yes ☐ No	Compile the necessary documents to allow management to conduct their review.	
3. Is the management review documented?	☐ Yes ☐ No	Ensure that the review is documented.	
4. Have you answered Yes to the above question?	☐ Yes ☐ No	Assign a person(s) to address management review and conformance with section 4.6 of the ISO 14001 standard.	

** All page #'s refer to the location in this document where guidance on each element can be found*

TABLE 3.2
SAMPLE IMPLEMENTATION SCHEDULE

ITEM	ELEMENT	PERSON RESPONSIBLE	ACTIVITY	MONTH											
				1	2	3	4	5	6	7	8	9	10	11	12
1	4.2	Director/Manager, Waste Management	Develop draft policy	X											
2	4.3.1	EMS Project Coordinator	Identify aspects & impacts		X										
3	4.3.1	EMS Project Coordinator	Identify significant aspects			X									
4	4.3.1	EMS Project Coordinator	Quantify significant aspects			X	X								
5	4.3.2	EMS Project Coordinator	Identify appropriate legal requirements			X	X								
6	4.3.3	EMS Project Coordinator	Establish objectives & targets					X							
7	several	Facility Managers	Develop procedures					X	X	X	X				
8	4.4.1	Manager, Waste Management	Determine roles and responsibilities				X								
9	4.4.2	EMS Project Coordinator	Determine training needs						X						
10	4.4.2	HR Manager	Training							X	X	X	X	X	X
11	4.4.3	HR Manager	Establish a communication procedure							X					
12	4.4.4 4.4.5	EMS Project Coordinator	Establish a documentation system								X	X			
13	4.4.6	Facility Managers	Establish/improve operational controls								X	X	X	X	X
14	4.4.7	Facility Managers	Establish/improve emergency procedures									X	X	X	X
15	4.5.1	Facility Managers	Establish/improve monitoring & measurement system										X	X	X
16	4.5.4	EMS Project Coordinator	Complete EMS Audit											X	
17	4.6	Director/Manager Waste Management	Complete Management Review												X
18	-	EMS Project Coordinator	Documentation Review										X		
19	-	EMS Project Coordinator	Preassessment											X	
20	-	EMS Project Coordinator	Registration Audit												X

4.0 ENVIRONMENTAL POLICY (ELEMENT 4.2)

4.1 Key Elements of an Environmental Policy

An Environmental Policy is required as part of an ISO 14001 EMS in order to demonstrate senior management's internal and external commitment to conformance with the standard, as well as with applicable environmental laws. One reason for requiring that *top management* be responsible for defining the environmental policy is to ensure that the policy is consistent with the organization's overall business goals and objectives. Also, the Environmental Policy is much more likely to be taken seriously by an organization's middle management and employees when it is endorsed, supported and signed-off by senior management. Senior management, in the context of a municipal waste management system could for example be the Director or Manager of Waste Management and/or the Commissioner of Public Works.

The Environmental Policy is the driver for implementing and improving an EMS so that it can maintain and potentially improve, on a continual basis, its environmental performance within the overall context of the municipality's business and environmental goals. The specific requirements of the standard for an Environmental Policy are as follows:

Clause 4.2 Environmental Policy

- *Top management shall define the organization's environmental policy and ensure that it is appropriate to the nature, scale and environmental impacts of its activities, products or services;*
- *includes a commitment to continual improvement and prevention of pollution;*
- *includes a commitment to comply with relevant environmental legislation and regulations, and with other requirements to which the organization subscribes;*
- *provides the framework for setting and reviewing environmental objectives and targets;*
- *is documented, implemented and maintained and communicated to all employees; and*
- *is available to the public.*

In addition to these requirements, an Environmental Policy may also include the municipality's current formal mission and vision statement. In the development of an Environmental Policy the following should be considered:

- nature and scale of organization;
- scope of the policy;
- local or regional conditions;
- framework for objectives and targets;
- existing policy statements to ensure consistency;
- the municipality's overall goals and guiding principles; and,
- key stakeholder concerns and requirements.

Stakeholders may include, but are not limited to interested key parties, elected municipal officials, customers, regulatory agencies, the general public / community, and key contractors (e.g. waste haulers).

The Environmental Policy should be reviewed and revised as appropriate, based on the established review period and/or facility changes. The Policy should be communicated to all new employees.

4.2 Sample Environmental Policy

A sample Environmental Policy that has been developed to conform to the requirements of the standard is provided in Table B.1 in Appendix B. Care should be used when developing your policy to ensure that it:

- conforms to all the ISO 14001 requirements and more importantly that it is appropriately defines the services offered by your Municipality (e.g. provides landfilling, blue-box, composting);
- indicates that your Muncipality will periodically evaluate its activities, and measure environmental performance against established (stated) goals; and

- identify (in general terms) the mechanisms to be utilized to measure environmental performance.

4.3 Registration Hints

Registrars will most likely attempt to determine if the Environmental Policy has in fact been communicated and understood by employees. Ensure that employees (at all levels) are aware of the existence of the Policy, understand how it affects their day-to-day work, and know how they can obtain a copy (if they so desire). Also, ensure that the policy is available to the public. In addition, Registrars may also seek objective evidence to ensure that the commitments made in the Policy are being kept. Your municipality should ensure that it can live up to the expectations of what has been written and/or "promised" by the Policy.

5.0 PLANNING (ELEMENT 4.3)

5.1 Environmental Aspects and Impacts

5.1.1 Understanding Aspects and Impacts

One of the most important activities in the implementation of an EMS is the identification of the environmental aspects of the waste management system that need to be systematically managed. Examples of aspects include air emissions, waste generation, wastewater effluent and consumption of resources. As defined in Section 3.0, an environmental aspect includes elements of your operations, products or services that can interact with the environment. An environmental impact is any change to the environment resulting from aspects of the waste management system. Examples of environmental impacts are air pollution, water pollution, resource depletion, etc.

ISO 14001 requires an organization to identify potential environmental aspects and methodically assess their significance. The specific requirements of the ISO 14001 standard are:

Clause 4.3.1 Environmental aspects

The organization shall establish and maintain (a) procedure(s) to identify the environmental aspects of its activities, products or services that it can control and over which it can be expected to have an influence, in order to determine those which have or can have significant impacts on the environment. The organization shall ensure that the aspects related to these significant impacts are considered in setting its environmental objectives.

The organization shall keep this information up-to-date.

The environmental aspect clause is by far one of the most misunderstood of ISO 14001 requirements. This is mainly due to the fact that not only must aspects and impacts be identified, but the level of influence one has over them and their significance has to be assessed. Obviously municipalities have influence over the operations of facilities that they operate. It can be argued however that they also have influence over the activities of

their contractors. This influence may for example be exercised by requiring contractors to have an environmental management system in place, or meet certain environmental performance criteria. In such a case, the municipality's EMS would contain procedures to ensure conformance with the requirements in the course of ongoing contract management. In addition, it can also be argued that municipalities have influence over the actions of residents. For example, levies or by-laws may be used to promote specific desirable actions. This should also be taken into consideration when identifying aspects.

The following sections are provided to assist municipalities to more easily identify the environmental aspects and environmental impacts that the activities, products and services of the facility may create. The evaluation of aspects and impacts must consider all operating conditions including those associated with normal, abnormal (i.e. process upset), maintenance, emergency, start-up and shut-down conditions. In addition, the evaluation must include actual impacts as well as potential impacts that may occur. It is important to note that environmental aspects/impacts can be negative or positive. For example, one environmental impact of a leachate collection treatment system is that it reduces surface and ground water contamination. This obviously has a positive impact on the environment.

5.1.2 Identification of Aspects and Impacts

In order to assist municipalities in the identification of aspects and impacts we have included in this guide flow sheets for the following common waste management operations have been developed (Figures 5.1 to 5.5):

- waste collection;
- material recovery facilities (MRF);
- composting operations;
- energy from waste facilities (EFW); and,
- landfilling

The waste management operations noted above do not take into account all of the operations associated with a municipality. The flow sheets provided are only examples and each municipality will need to customize them to reflect the activities and processes that are used at their facilities. The aspects/impacts listed are not meant to be exhaustive. In addition, the flow sheets only address environmental aspects and impacts of normal

operations. The standard requires that in addition to normal operating conditions, environmental aspects and impacts must be identified for maintenance, start-up, shut-down, abnormal and emergency situations. The level of detail in which aspects are defined will depend upon the significance of these aspects and the resources available to the municipality. For example, an aspect can be defined as "air emissions" or, it can be broken down into specific compounds (e.g. methane, nitrogen oxides, heavy metals, etc.).

As a general guide, the definition of an aspect must be sufficiently detailed to allow the implementation of an effective monitoring and measuring program for significant aspects and operational controls.

Environmental aspects and impacts associated with maintenance activities are typically related to activities such as:

- servicing equipment;
- the use of lubricants;
- generation of waste oil;
- emissions from welding equipment, floor washing; and,
- the generation of waste from maintenance activities.

ISO 14001 requires that in identifying environmental aspects, an organization should consider not only normal operations but also start-up, shut-down, abnormal conditions and emergency conditions. Environmental aspects and impacts associated with start-up and shut-down may be related to the operation of an energy from waste or landfill gas combustion facility. Abnormal conditions can occur as a result of a process upset, the breakdown of process equipment and other deviations from normal operating conditions. Examples of aspects associated with emergency conditions include the potential for explosion through migration of methane from a landfill to a confined space, landfill fires, failure of air pollution control equipment at an energy from waste plant, etc.

As discussed in Section 5.1.1 above, municipalities may have control over, or influence on contractors that collect, process and dispose waste. The degree of control or influence will vary with circumstances. ISO 14001 requires that the municipality identify those aspects over which it has an influence.

FIGURE 5.1
TYPICAL ASPECTS AND IMPACTS ASSOCIATED WITH WASTE COLLECTION: NORMAL OPERATIONS

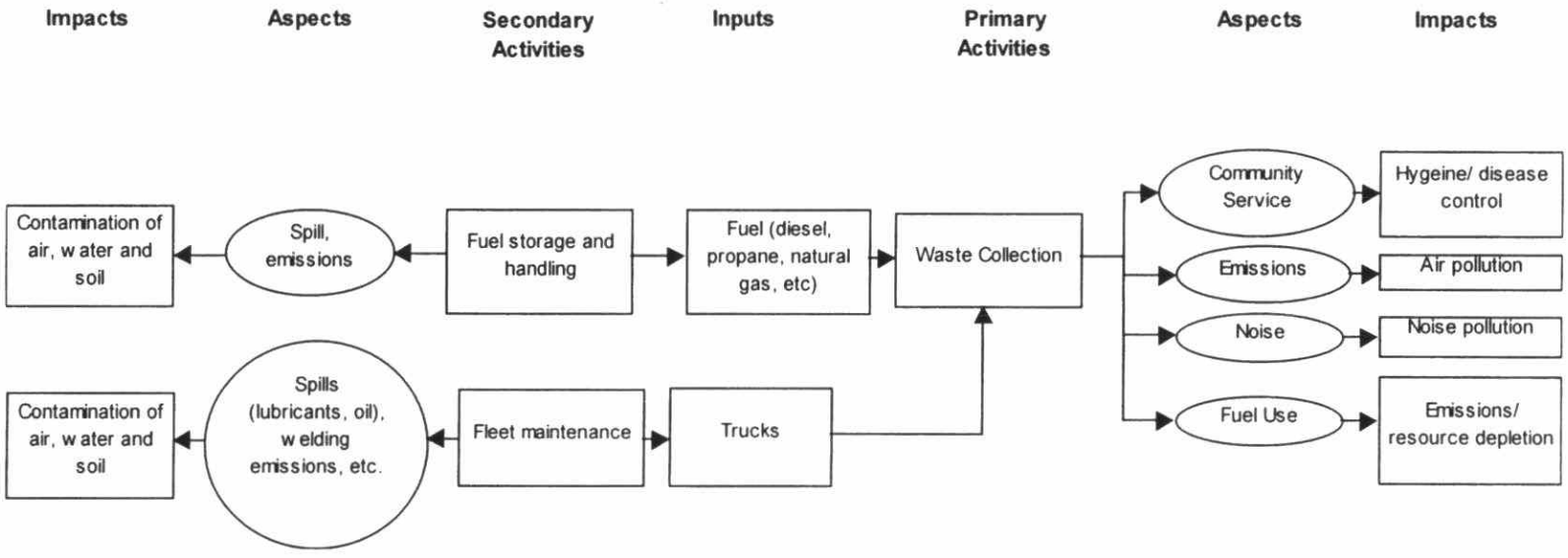


FIGURE 5.2
TYPICAL ASPECTS AND IMPACTS FOR A MATERIALS RECOVERY FACILITY (MRF): NORMAL OPERATIONS

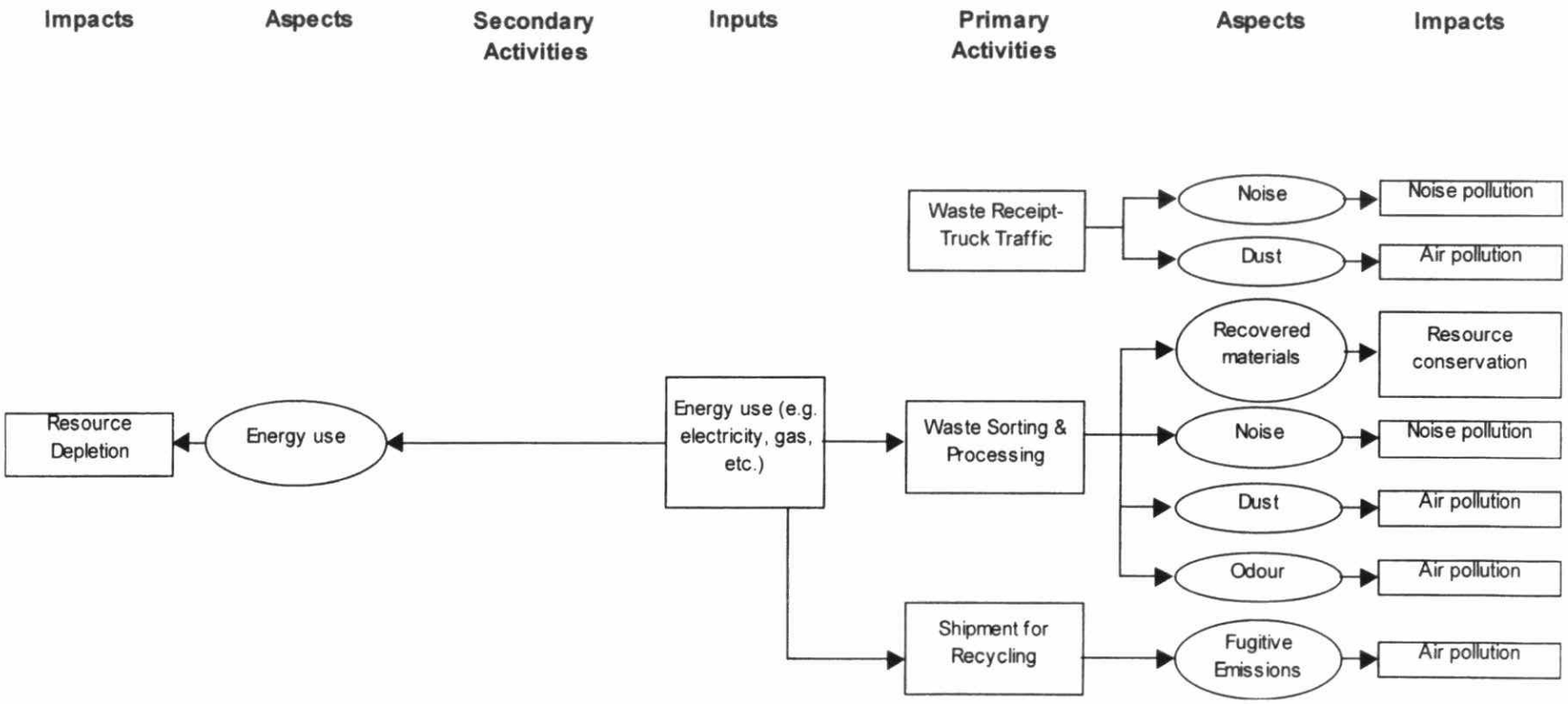


FIGURE 5.3
TYPICAL ASPECTS AND IMPACTS FOR A COMPOST FACILITY: NORMAL OPERATIONS

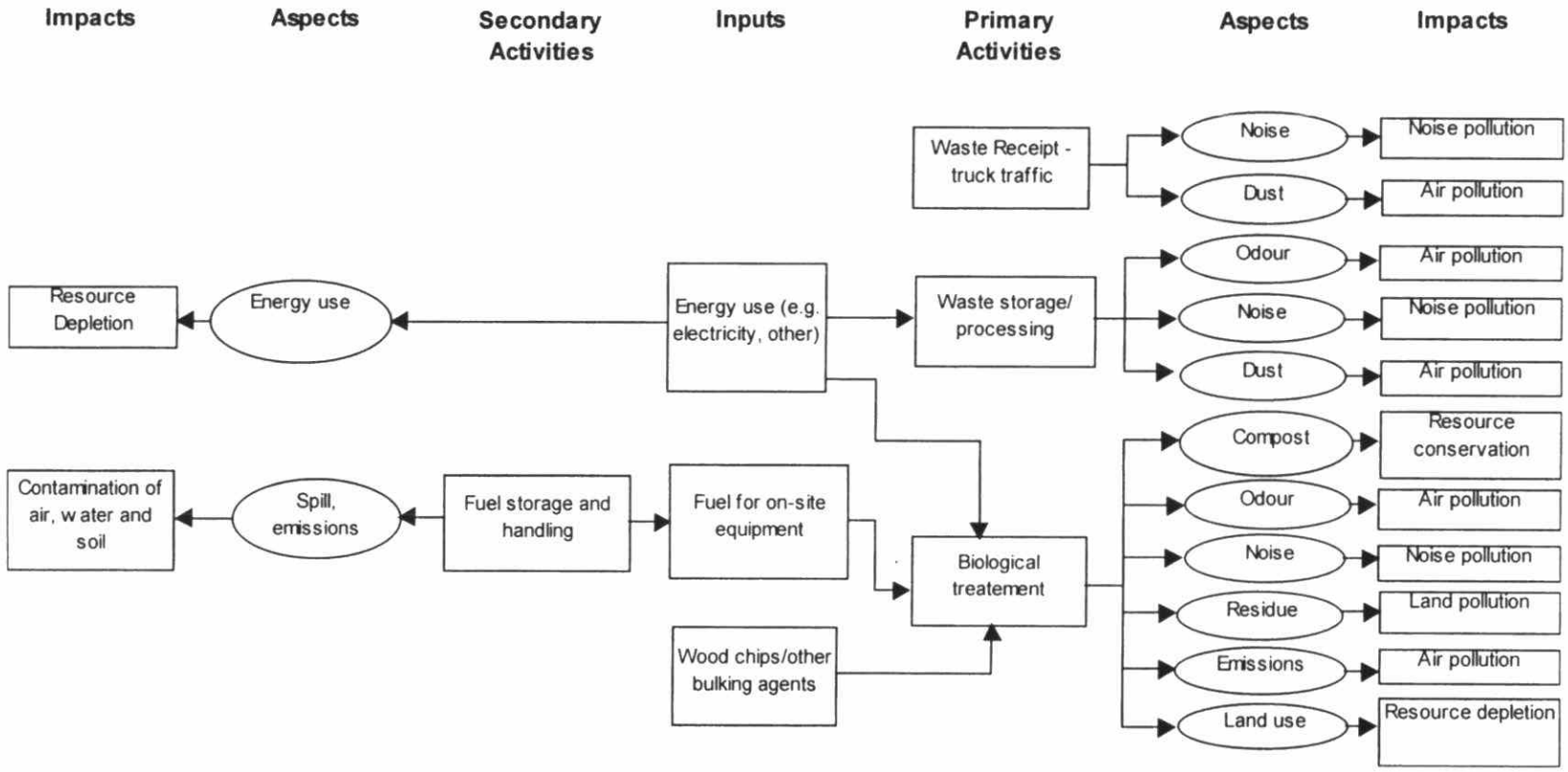


FIGURE 5.4
TYPICAL ASPECTS AND IMPACTS FOR AN EFW FACILITY: NORMAL OPERATIONS

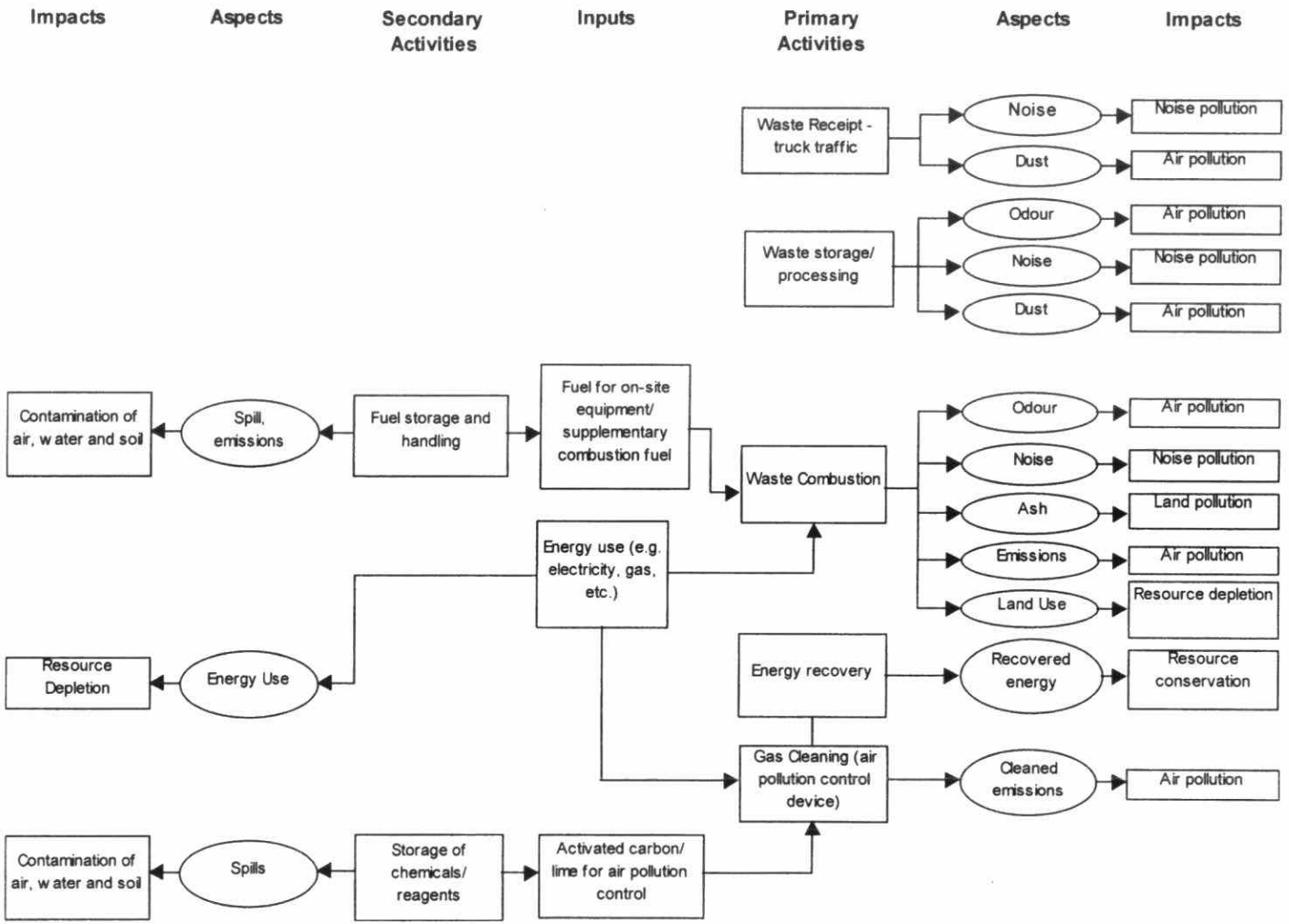
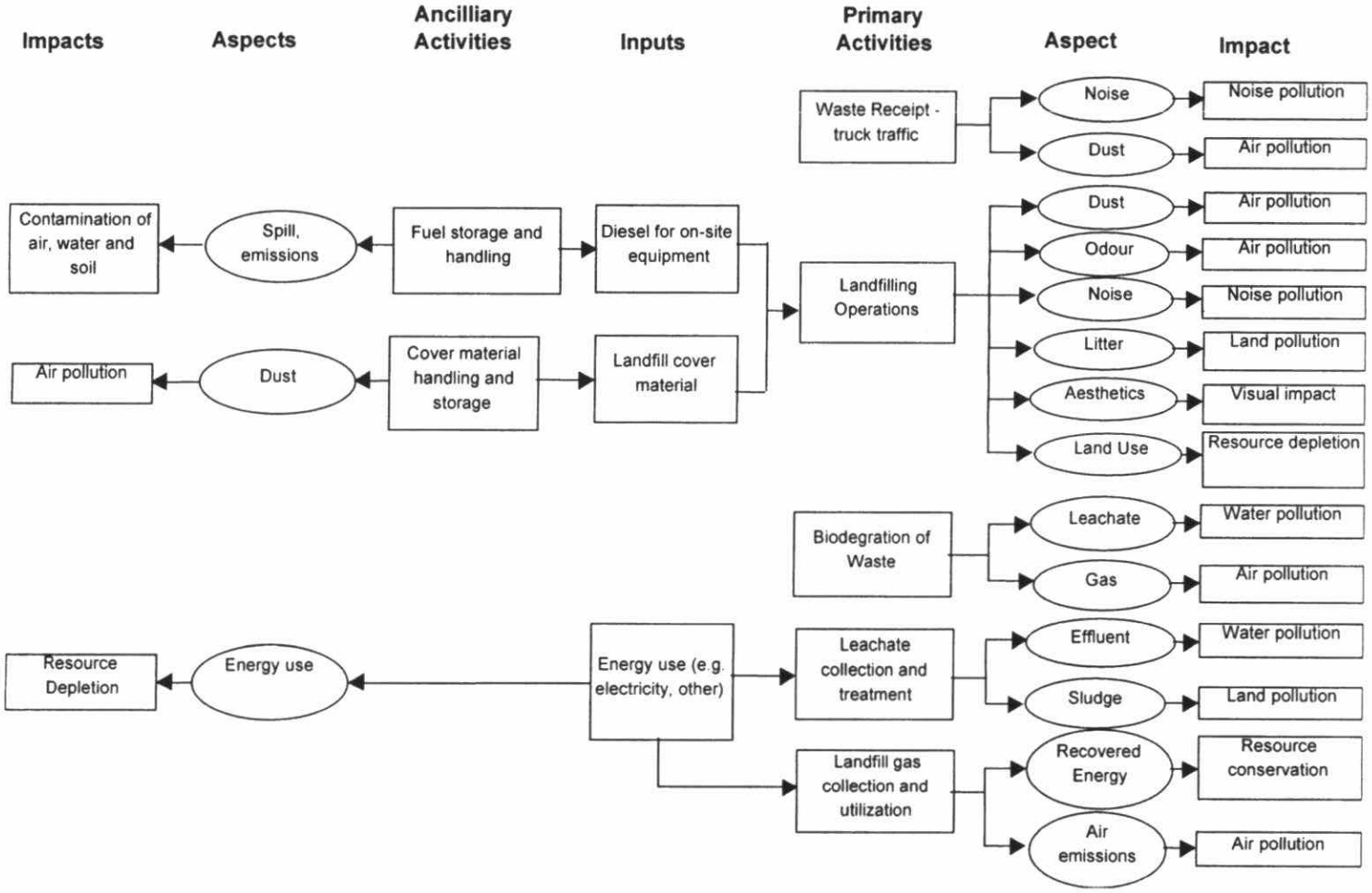


FIGURE 5.5
TYPICAL ASPECTS AND IMPACTS FOR LANDFILLING: NORMAL OPERATIONS



5.1.3 Evaluation of Significance

ISO 14001 requires that the aspects with significant impacts be considered in setting environmental objectives, determining which activities require operational control and determining which activities require monitoring. The significance of an impact will depend upon a number of factors including the probability of an occurrence of a discharge to the environment, the severity of the impact such a discharge would cause, and the ability to detect deviation from expected practices.

ISO 14001 does not prescribe a method for identifying the significance of environmental aspects. It does however require that significance be determined systematically. A number of methods for determining the significance of aspects are available. These include:

- Qualitative evaluation (significant or not significant);
- Qualitative and quantitative evaluation of the likelihood and the consequences of an occurrence of a discharge to the environment; and
- Life cycle inventory tools for waste management which have, or, are in the process of being developed (including the EPIC/CSR Integrated Waste Management Model).

While a detailed description of all the methods that can potentially be used to determine significance is not within the scope of this document, the following provides an overview of one method that is commonly used to determine significance.

The sample method considers three elements; the severity of the impact, the likelihood of the impact occurring, and the ability to decrease the severity of the impact once it has occurred. Tables 5.1 to 5.3 provide evaluation criteria. The final score is calculated by multiplying the results from the three tables. This gives a score with a potential maximum of 1000 (since the maximum score on each table is 10).

For example, an impact of moderate severity (score of 8), which occurs approximately once per year (score of 4) and for which the municipality has no means to mitigate (score 10) would get an overall score of 320.

The calculated scores can then be used to rank the impacts relative to each other in terms of significance and an aspects/impacts inventory created. As with any scoring system, the results of the evaluation should be reviewed by senior staff as a reality check.

TABLE 5.1 EVALUATION OF THE SEVERITY OF AN IMPACT	
RANK	**CRITERIA**
10	May endanger human health or cause non-reversible major environmental damage.
9	Major environmental reversible (long-term) damage, potential loss of business, exceeds regulatory limits.
8	Moderate environmental reversible (short term) damage, exceed regulatory limits.
7	Minimal environmental reversible (short-term) damage may exceed regulatory limits.
6	Reversible effects on the environment (long term), within regulations.
5	Reversible effects on the environment (short term), within regulations.
4	Nuisance, minimal disturbance beyond the immediate neighbourhood (odour, noise, visible plume), within regulations.
3	Nuisance, minimal disturbance within the neighbourhood (odour, noise, visible plume), within regulations.
2	No effect, within regulations.
1	No effect, not regulated.

TABLE 5.2 EVALUATION OF THE LIKELIHOOD OF AN IMPACT OCCURRING	
RANK	CRITERIA
10	Impact is currently occurring and occurs continuously.
8	Impact occurs frequently (once per shift).
6	Impact occurs occasionally (once per week to once per month).
4	Impact seldom occurs (once per year).
2	Impact is unlikely to occur or has never occurred.
1	Impact is highly unlikely to occur and has never occurred.

TABLE 5.3 EVALUATION OF THE ABILITY TO MITIGATE AN IMPACT ONCE IT HAS OCCURRED	
RANK	CRITERIA
10	No means available to mitigate impact.
8	Emergency procedure likely to be ineffective in preventing permanent environmental damage.
6	Prompt implementation of emergency procedure will stop further permanent environmental damage.
4	Prompt implementation of emergency procedure will prevent permanent environmental damage.
2	Prompt implementation of emergency procedure may prevent off-site impacts.
1	Prompt implementation of emergency procedure will prevent off-site impacts.

CSA International is in the process of finalizing a document entitled: "A Guide to Identifying Significant Environmental Aspects". The CSA document will provide tools to simplify the task of identifying significant environmental aspects. It will contain examples of various approaches to identifying environmental aspects, impacts and determining their significance. It is recommended that municipalities implementing ISO 14001 consult this document for additional information.

5.1.4 Establishing a Procedure for Identifying Environmental Aspects

One of the requirements of ISO 14001 is that a formal procedure for identifying aspects be established. A sample standard operating procedure for identifying environmental aspects is provided in Table B.2 in Appendix B. In tailoring this procedure for your municipality consider who should be involved in the evaluation of the process operations, what specific significance criteria are applicable to your operations, and how changes of activity are to be identified by the EMS Coordinator. The procedure should be designed to ensure that the effects of changes in process and operating procedures and plant modifications/expansions on the environmental aspects and impacts of the municipal waste management system are assessed on an on-going basis.

Included in the sample procedures is a reference to two schedules: one for significant evaluation criteria, and a second for a summary of the environmental aspects and significance. A sample schedule of the summary of environmental aspects and significance is provided in Table B.3 in Appendix B.

5.1.5 Registration Hints

Although ISO 14001 does not require that the environmental aspect evaluation procedure be documented, the Registrar will likely want to understand how the significant aspects were identified.

Interviews with selected personnel, involved in the aspect identification process and/or a review of relevant documented procedures may take place in order to determine any system non-conformances. More specifically, the Registrar may attempt to determine if there are inconsistencies between standard operating procedures, the results of applying the procedure, and/or the Environmental Policy and your municipality's overall environmental objectives and targets.

If your procedure for identifying environmental aspects indicates that the EMS Coordinator (for example) is responsible to update aspects whenever changes to activities are undertaken (if applicable), the Registrar may follow up to assess the communication procedure utilized to notify the Coordinator of such changes. The Registrar may also check if the appropriate in-house personnel have been trained to recognize activity changes that may affect the municipality's aspects.

5.2 Legal and Other Requirements

5.2.1 Reference in ISO 14001

The objective of this section of ISO 14001 is to ensure that the organization is aware of all applicable environmental legislation, that operations and activities are monitored to ensure compliance with legislation, and that the organization has a means to keep up to date with changing regulations. The specific requirements of the standard are:

Clause 4.3.2 Legal and other requirements

The organization shall establish and maintain a procedure to identify and have access to legal and other requirements to which the organization subscribes, that are applicable to the environmental aspects of its activities, products or services.

This clause does not require that the organization be in compliance with all applicable environmental legislation before it develops an EMS. However, the standard does require the organization to make a commitment to comply with applicable legislation and regulations in its environmental policy and put a framework in place to ensure that this happens.

5.2.2 Sector Specific Legal Requirements

Table 5.4 provides a list of the major legislation/regulations governing waste management operations in Ontario. It should be noted that the regulatory framework is constantly evolving - most of these acts and regulations have been amended a number of times, especially Regulation 347, and it is likely that there will continue to be further amendments and revisions.

It should also be noted that if a municipality subscribes to voluntary standards (such as the Partners for Climate Protection Program of the Federation of Canadian Municipalities (FCM)) these standards or guidelines become part of the municipality's EMS. Thus, procedures should be developed to ensure that changes in the requirements of these standards are tracked, in the same way as those for legal requirements.

5.2.3 Obtaining Copies of Legislation

Copies of Ontario Legislation and guidelines can be obtained from

- the local library
- Publications Ontario (1-800-668-9938)
  (www.gov.on.ca/MBS/english/publications/statregs/index.html)
- the MOE website (www.ene.gov.on.ca)

Copies of Federal Legislation can be obtained from:

- the local library
- Environment Canada's website (www.doe.ca/who/acteng.html)
- Government of Canada website (canada.justice.gc.ca/Loireg/index_en.html)

Table 5.4

Applicable Waste Management Legislation

Jurisdiction	Environmental Issue	Legislation
Federal	Transportation of hazardous goods	The Canadian Transportation of Dangerous Goods Act and Regulations
Federal	A facility is located near fish habitat.	Fisheries Act, and Regulations
Provincial	Recycling and Composting of Municipal Waste	Environmental Protection Act (EPA) (Reg. 101/94)
Provincial	A Certificate of Approval (C of A) is required to operate a landfill, transfer station, waste processing or handling facility	Environmental Protection Act (EPA)
Provincial	Air emissions at facility	EPA, Regulation 346- Air
Provincial	Facility and equipment maintenance results in the generation of industrial wastes. Household hazardous waste may also require management.	EPA, Regulation 347- Waste Management
Provincial	PCBs may be present in facility.	EPA, Regulation 362- PCBs
Provincial	Labeling of containers, material safety data sheets and training	Occupational Health and Safety Act, Regulation 860 – WHMIS
Provincial	Storage and handling of flammable material, including flammable and combustible liquids	Fire Protection and Prevention Act (FPPA) and Fire Code
Provincial	Storage tanks containing fuel oil for heating purposes	Energy Act and Energy Code
Provincial	Potential discharges (for example, leachate) to surface water	Ontario Water Resources Act (OWRA)
Provincial	Potential discharges to groundwater	EPA
Municipal	Discharges to storm or sanitary sewer	Local municipal sewer use by-law

5.2.4 Keeping up-to-date with Changing Legislation and Policies

ISO 14001 requires that a procedure be established for monitoring changes to legislation. As with identifying appropriate legislation, monitoring legal changes needs to occur in the context of the municipality's operations. There are a number of ways of keeping up-to-date with changing legislation, including but not limited to

- Commercial subscription agencies: A number of publishers provide regular and updated copies of environmental legislation applicable in Ontario, either on CD-ROM or in print form. The Canadian Centre for Occupational Health and Safety provides this service for a fee. By using such a service, the municipality is assured of having full text versions in-house of all applicable legislation. Many commercial subscription agencies make available quarterly legislative updates provided via CD-ROMS (e.g. EcoLog, Environmental Law Partner, and EnviroOSH).

- Ontario Gazette: This is the official weekly publication of the Ontario government that publishes the full text of new and amended regulations as they are made law. An index at the back can be quickly scanned; new environmental regulations can then be copied and filed in a central location or distributed to staff.

- Newsletters and periodicals: Trade publications often devote a section to new and forthcoming regulations. In addition, there are several newsletters that specialize in providing national environmental news, including changes to federal and provincial regulations.

- Environmental Registry: Under the Ontario Environmental Bill of Rights, notices of new and amended regulations, acts, policies and instruments are posted on the Internet, if they are deemed to have a potential impact or effect on the environment. In some cases, the full text of these proposed new regulations, acts or policies are also included and can be downloaded free of charge. The Environmental Registry's Internet address is www.ene.gov.on.ca/envision/ebr/welcome.html.

- The Ministry of the Environment's web site contains regulations and guidelines that can be downloaded free of charge. The Internet address for the MOE is www.ene.gov.on.ca. Notices of changes to provincial government policies, for all ministries including the Ministry of the Environment, are often posted on the Environmental Registry. In addition, trade newsletters contain news of new and forthcoming voluntary standards and policies. Waste management and environmental

associations are also a good source of information. Certificates of Approvals can also be very helpful in determining applicable legislation, as well as assisting to identify the monitors, measurements, records and operations required.

- Environmental Compliance Audits: It is frequently recommended that an organization retain the services of a specialist, either internal or external, who is experienced in conducting environmental compliance audits. Environmental compliance auditors will look at all environmental components of an organization's operations and will then identify relevant sections of statutes and regulations that are applicable to that organization. From a due diligence standpoint, some environmental lawyers suggest that these audits be performed every 2 to 3 years.

- attending conferences or seminars on environmental issues

- reading specialty conference publications

- reading law summaries provided by environmental law firms

5.2.5 Procedural Requirements

Although the standard does not specify that the procedure for identifying legal requirements be documented, it does require that an organization be able to demonstrate that it has a procedure in place to accomplish this. There is also no requirement on how changes to legislation should be monitored; however, it does make it easier if one person or a small group is authorized to take responsibility for ensuring that legislation is identified, monitored, obtained and kept for reference.

It is recommended that a documented procedure be developed to show:

- how often the Environmental Registry or other sources such as newsletters are reviewed;

- how changes to legislation are communicated to staff (internet site, memos, training sessions, etc);

- where staff can access copies of legislation for reference.

In order to assist the municipality to implement this section of the standard, a sample standard operating procedure is provided in Table B.4 in Appendix B. In-house

procedures should also note the mechanisms for keeping track of changes that may affect legal (and other) requirements, regulations, corporate or industry standards and/or process/facility regulatory changes.

The standard also requires that there be a procedure in place to track "other requirements to which the organization subscribes, that are applicable to the environmental aspects of its activities, products or services." The procedure for identifying and accessing voluntary standards and guidelines is essentially the same as that for legal requirements.

5.2.6 Registration Hints

Legislative requirements will undoubtedly be an important component of the registration audit. The Registrar will likely review applicable standard operating procedures to determine if legislative requirements have been noted and/or referenced. In addition, the Registrar may also follow up directly with those employees whose procedures and/or processes may have been modified as a result of any recent legislative changes that may have occurred. The Registrar may also ask employees about when and how they became aware of the legislative requirements. Training records may also be reviewed to ensure that applicable requirements have been met (e.g. TDGA).

5.3 Objectives, Targets and Indicators

5.3.1 References in ISO 14001

The setting and updating of objectives and measurable targets is necessary to ensure that the EMS is meeting the municipality's Environmental Policy and achieving its overall goal of improving environmental performance. The specific requirements of ISO 14001 are:

Clause 4.3.3 Objectives and targets

The organization shall establish and maintain documented environmental objectives and targets, at each relevant function and level within the organization.

When establishing and reviewing its objectives, an organization shall consider the legal and other requirements, its significant environmental aspects, its technological options and its financial, operational and business requirements, and the views of interested parties.

The objectives and targets shall be consistent with the environmental policy, including the commitment to prevention of pollution.

In establishing objectives and targets, the municipality should consider two things: significant aspects and impacts; and, regulatory requirements. By the time the municipality reaches this point in the development of an EMS, both significant impacts and legal requirements will have been identified.

As previously discussed, the Environmental Policy states the municipality's environmental principles and overall goals, whereas objectives and targets translate these principles and goals into specific and measurable terms.

In accordance with ISO 14001 an **environmental objective** is an "*...overall environmental goal, arising from the Environmental Policy, that an organization sets itself to achieve, and which is quantified where practicable.*" Therefore, when establishing the environmental objective(s), the municipality should take into account relevant findings from former environmental reviews, as well as identified environmental aspects and associated environmental impacts. Once the environmental objectives are identified, targets can be set to achieve these objectives within a specified time frame.

The standard defines an **environmental target** as a "*...detailed performance requirement, quantified where practicable, applicable to the organization or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.*" Environmental targets should be measurable, and where appropriate, take preventative measures into account. Objectives and targets can apply broadly/ corporately across the municipality, or more narrowly to site-specific activities.

5.3.2 Identify Potential Objectives and Targets

The following describes one process that can be used to identify potential objectives and targets.

1. List the significant aspects identified previously.

2. For each aspect identify a potential objective and one or more targets.

3. Identify additional objectives and targets related to legal and other requirements, and input from interested parties.

4. Estimate the costs and savings associated with achieving each of the targets and review these against the municipality's financial capabilities and constraints.

5. List all known barriers and benefits of meeting the target taking into account operational, market, employee and other interested party input.

6. Based on the information gathered in steps 1-5 above, establish objectives and targets for those aspects, which can be reduced in significance. Legal and other requirements, technical options, financial, operational and business requirements and the views of interested parties must be considered in establishing objectives.

7. Update targets as they are achieved and set new objectives and targets, as appropriate relying on the inventory developed above.

Some examples of objectives and targets applicable to municipal waste management operations are listed in Table 5.5. It is important to note that targets must be measurable and timelines should also be included.

TABLE 5.5
SAMPLE OBJECTIVES AND TARGETS

OBJECTIVE	TARGET
Increase waste diversion	Reduce the quantity of waste sent to landfill by x% by December 2001. Increase percentage of waste recycled by x% by December 2001.
Reduce air emissions from municipal operations	Reduce the quantity of greenhouse gases by x% by December 2001.
Reduce the impact of landfill leachate on the environment	Pretreat leachate prior to discharge to sewer by December 2001.
Reduce energy consumption	Reduce annual diesel consumption by x% by December 2001. Recover x gigajoules (GJ) of energy from waste by December 2001. Recover x GJ of energy from landfill gas by December 2001.
Reduce water use	Reduce annual water consumption (m^3) by x% by December 2000.

5.4. Environmental Performance Indicators

Once objectives and targets are established, the next step is to decide what specific measurable indicators will be used to measure progress toward meeting them. Environmental Performance Indicators (EPIs) can be used to do this. ISO 14031 discusses the use of EPIs within the overall context of an Environmental Performance Evaluation (EPE).

The objective of an EPE is to provide management with reliable and verifiable information on an ongoing basis. The basic premise of an EPE is that what gets measured gets done. Measurements allow an organization to more clearly understand and quantify where it is and how far it has to go to meet its environmental goals, objectives and targets. Establishing EPIs is a key element of an EPE.

5.4.1 Understanding EPIs

Given the diversity of municipal waste management operations, objectives and organizational structures, each municipality should select EPIs that are recognized as important to achieving its overall environmental performance criteria. It is most important to understand that EPIs designate a measurable dimension to track the achievement of your overall environmental objectives and targets.

EPIs can be used to measure the performance of operations and processes, management systems and environmental conditions. The Integrated Waste Management (IWM) Model that was developed jointly by CSR and EPIC with input from partner municipalities can be used to quantify a number of waste management related EPIs. The model uses a life cycle inventory approach to quantify energy consumption and emissions associated with waste management processes. Table 5.6 lists the environmental parameters (energy and emissions) quantified by the IWM Model. The model estimates total energy use and emissions resulting from a user specified waste management strategy (which can include one or more of collection, transportation, recycling, composting, energy recovery and landfill). Normalizing the model results to energy use and emission released per tonne of waste managed can provide a good means of tracking the performance of a waste management system from year to year. A paper which provides an overview of the IWM Model is attached in Appendix C.

It is important to note that ISO 14001 does not require the use of a life cycle methodology in the evaluation of environmental aspects and impacts. The standard only requires the

evaluation of aspects over which the municipality has control or influence. A life cycle approach does however, help to ensure that resources are preferentially allocated to addressing those aspects and impacts that can have a greater overall benefit to the environment.

TABLE 5.6
ENVIRONMENTAL PARAMETERS EVALUATED IN THE IWM MODEL

Indicator Parameter	Indicator of	Indicator Parameter	Indicator of
Energy	Resource depletion		
Total Energy Consumed			
Emissions to Air		**Emissions to Water**	
Greenhouse Gases	Climate change	Heavy Metals	Health risk, environmental degradation
Carbon dioxide (CO_2)		Lead (Pb)	
Methane (CH_4)		Cadmium (Cd)	
		Mercury (Hg)	
Acid Gases	Acidification, health risk	Trace Organics	Health risk, environmental degradation
Nitrogen oxides (NOx)		Dioxins & Furans (TEQ)	
Sulphur dioxide (SO_2)			
Hydrogen Chloride (HCl)			
Smog Precursors	Urban smog formation, health risk	Biochemical Oxygen Demand (BOD)	Water quality, environmental degradation
Volatile Organic Compounds			
Nitrogen oxides (NOx)			
Particulate Matter (<10 microns) (PM-10)			
Heavy Metals	Health risk	**Emissions to Land**	
Lead (Pb)		Residual Solid Waste	Land use disruption
Cadmium (Cd)			
Mercury (Hg)			
Trace Organics	Health risk		
Dioxins & Furans (TEQ)			

The EPIs discussed above measure the environmental performance of operations. EPIs can also be used measure the performance of management systems so as to identify root causes where actual performance either exceeds, or does not meet environmental performance criteria. Some examples of EPIs that measure the performance of management activities include:

- the number of contracted service providers with an EMS;
- the number of emergency drills conducted;

- the percentage of employees that are trained in the environmental requirements of their jobs, etc.

A third type of EPI measures the change in environmental conditions that occur over time. For example a municipality may want to track the impact of its waste management system on:

- the quality of ambient air in the vicinity of a waste management facility;
- odour levels measured at a specific distances from the landfill,
- weighted average noise levels at the perimeter of the transfer station,
- concentration of nitrates in a near by surface water body.

It is important to note that while their use is not specifically required by ISO 14001, EPIs can be an important tool tracking the performance of an EMS so as to ensure that objectives and targets are being met.

5.4.2 Registration Hints

Ensure that objectives and targets have been set for the waste management system's significant environmental aspects. Be prepared to explain your reasoning for selecting particular objectives and targets. Furthermore, confirm that your objectives and targets are consistent with the Environmental Policy particularly those which focus on the municipality's commitment to prevention of pollution.

5.5 Environmental Management Program

5.5.1 Reference in ISO 14001

The purpose of the environmental management program is to ensure that the municipality's objectives and targets are met. The environmental management program sets out who is responsible for the objectives and targets, how they will be achieved, and by when they will be achieved. The following are the specific requirements of ISO 14001:

Clause 4.3.4 Environmental Management Programme(s)

The organization shall establish and maintain (a) programme(s) for achieving its objectives and targets. It shall include

1. *designation of responsibility for achieving objectives and targets at each relevant function and level of the organization;*

2. *the means and time-frame by which they are to be achieved.*

If a project relates to new developments and new or modified activities, products or services, programme(s) shall be amended where relevant to ensure the environmental management applies to such projects.

The last sentence in this section of the standard relates to changes to activities and products. New projects trigger the need to identify and analyze associated aspects and related impacts, and, in turn, the need to identify possible new objectives and targets, and amendments to the environmental program(s). Examples of new projects in the context of waste management include changes in:

- collection programs (e.g. introducing co-collection of materials) changing three stream (recyclables, yard waste and garbage) collection to two stream (wet and dry) collection);
- addition of new waste handling and processing facilities (e.g. new compost facility, transfer station, materials recovery facility, energy from facility or landfill); and
- installation of new pollution control equipment (installation of landfill gas collection system, upgrading air pollution control equipment at the EFW, etc.).

5.5.2 Set up of Programs

The environmental management program should include resources, responsibilities, and schedules for attaining the objectives and targets in the municipality's Environmental Policy, as well as track the progress when meeting objectives and targets.

Municipal personnel identified in the environmental management programs may also include staff not directly related to environmental management (e.g. human resources, health and safety, contract personnel and internal management). It is important to include specific tasks and assignments of responsibility for each member of staff your municipality identifies.

One way of creating an environmental management program is to develop a worksheet for each objective and target, which identifies the actions needed, the person responsible, the date by each action should be completed and the resources required.

5.5.3 Registration Hints

Although the standard does not require that an environmental management program be documented, it is recommended to do so as it will make the auditing of your EMS simpler and will serve as a reference for both the personnel involved in the daily implementation of the EMS and new staff. Ensure that your documentation highlights a specific time frame that corresponds to time frames noted in your Environmental Policy. Similarly, tasks assigned to specific personnel should also be clearly documented. It is also important to ensure that if staff not related to the environmental department are listed as resources for the programs, that the department has control over the actions of the external department or individual.

6.0 IMPLEMENTATION AND OPERATION (ELEMENT 4.4)

6.1 Structure and Responsibility

6.1.1 Reference in ISO 14001

ISO 14001 requires that roles, responsibility and authority be clearly defined, documented and communicated. Upper management should provide the resources that are essential to assist in the implementation and control of the EMS. These resources include but are not limited to human resources, technology and financial resources. The specific requirements are as follows:

Clause 4.4.1 Structure and responsibility

Roles, responsibility and authority shall be defined, documented and communicated in order to facilitate effective environmental management.

Management shall provide the resources essential to the implementation and control of the environmental management system. Resources include human resources, specialized skills, technology and financial resources.

The organization's top management shall appoint (a) specific management representative(s) who, irrespective of other responsibilities, shall have defined roles, responsibilities and authority for

a) ensuring that environmental management system requirements are established, implemented and maintained in accordance with this International Standard;

b) reporting on the performance to top management for review and as a basis for improvement of the environmental management system.

6.1.2 Roles, Responsibilities and Authority (Job Descriptions)

In determining the appropriate structure for the EMS, several items should be addressed:

- Is the existing EMS structure sufficient to ensure conformance with ISO 14001?
- What capabilities are needed to make the system effective?

- To what degree should the system be centralized or decentralized (individual waste management facility managers responsible for various aspects)?
- What operations/activities need to be controlled? Who needs to be involved to ensure that controls are implemented?
- Who is to have the responsibility for ensuring implementation?
- Who will have the authority to make financial decisions?

Interrelationships within the municipality can be depicted using an organizational chart. The chart should show the interrelationships and include the lines of authority and accountability, although they typically do not include sufficient information to completely define responsibility and authority. The organizational chart should therefore be used in conjunction with documented job descriptions. It should be noted that job titles used in the sample procedures provided in the Appendices are for illustration only, and should be revised based on each municipality's organizational structure.

Job descriptions are generally developed for recruitment and salary purposes, and do not usually clearly reference EMS responsibilities. A good first step is to identify those individuals who have been designated with an EMS responsibility and ensure that the job descriptions are reviewed with Union representatives and in-house management. These job descriptions may have to be amended to more completely describe the roles that these individuals play within the municipality's EMS. Job descriptions should clearly detail the EMS-related responsibilities of the individual, the objectives they are accountable for achieving, and the decisions they are authorized to make. In addition, specific responsibilities and authorities should be clearly referenced in written EMS standard operating procedures.

6.1.3 Resource Requirements

ISO 14001 requires that sufficient resources be made available to ensure that the EMS can be implemented and sustained. Resources include financial resources, technical skills and human resources.

EMS resource requirements can be estimated by:

- assessing the level of effort the municipality's current EMS-related tasks require and attempt to estimate the incremental requirements of implementing ISO 14001.

- considering business/regional forecasting and (potential) new development plans when evaluating required resources.

6.1.4 Management Representative(s)

ISO 14001 requires that a management representative be appointed with the responsibility for ensuring that the EMS is implemented and communicated to all employees. This representative is also responsible for reporting on the EMS to senior management. The management representative must have sufficient authority with respect to environmental activities in the municipality to make decisions, take action, direct and coordinate the actions of others. Depending on the size and scope of the municipality and the activities covered by the EMS, the Management Representative may either act as the EMS Coordinator or appoint another member of staff to this position.

6.1.5 Registration Hints

Clearly document your municipality's environmental activities and the personnel (management and non-management) who are involved with those activities. Define, document and communicate the identified roles, responsibilities, and authorities using one or more of the following methods: organizational charts, job description or procedures. The Registrar may review selected job descriptions to determine if EMS responsibilities have been incorporated. In addition, the Registrar may follow up with a new employee (e.g. the person responsible for handling hazardous waste material) to determine if EMS responsibilities were reviewed and discussed during their initial job training.

6.2 Training, Awareness and Competence

6.2.1 Reference in ISO 14001

In order to ensure that environmental management is and continues to be conducted properly, it is essential that all personnel are provided with the appropriate level of training. The specific ISO 14001 requirements are as follows

Clause 4.4.2 Training, awareness and competence

The organization shall identify training needs. It shall require that all personnel whose work may create a significant impact upon the environment, have received appropriate

training; It shall establish and maintain procedures to make its employees or members at each relevant function and level aware of

1. *the importance of conformance with environmental policy and procedures and with the requirements of the environmental management system;*

2. *the significant environmental impacts, actual or potential, of their work activities and the environmental benefits of improved personal performance;*

3. *their roles and responsibilities in achieving conformance with environmental policies and procedures and with the requirements of the environmental management system including emergency preparedness and response requirements;*

4. *the potential consequences of departure from specified operating procedures.*

Personnel performing the tasks which can cause significant environmental impacts shall be competent on the basis of appropriate education, training, and/or experience.

6.2.2 Training Needs Identification (Overall and Job Specific)

Training needs should be identified based on an understanding of the ISO 14001 standard and the structure and responsibilities within the municipality. Not every employee will require the same type and amount of training. Nonetheless, in accordance with Clause 4.4.2 (above), everyone in the organization must have a basic awareness of the EMS.

Basic EMS training typically includes:

- a discussion on the organization's Environmental Policy;
- an overview of significant environmental aspects;
- a review of the objectives and targets; and,
- an understanding of emergency response and monitoring programs.

Additional job specific training may be required based on the municipality's environmental objectives and targets, operational procedures, regulatory requirements and significant environmental aspects and impacts. Employees should have the required

level of competency as well as an understanding of the impact(s) that their activities may have on the environment (if performed incorrectly).

6.2.3 External Contractor Responsibility

It is important to note that external contractors can also "*cause significant environmental impacts*" and as such they must also have the requisite training. Standard operating procedures and training requirements should be prepared for on-site contractors to ensure that they abide by the municipality's Environmental Policy. Municipalities may find it useful to prepare a "Contractor Environmental Responsibility Policy". This Policy could apply to any person or organization hired to perform contract work for or at the municipality. It provides a framework for establishing procedures to make contractors aware of their environmental responsibilities, to monitor their activities, and to take disciplinary action if necessary. A sample "Contractor Environmental Responsibility Policy" is provided in Table B.5 in Appendix B.

The municipality should require that contractors sign a form stating that they have been made aware of their environmental duties and responsibilities, and that they intend to comply with the municipality's "Contractor Environmental Responsibility Policy". In addition, the municipality may also want to stipulate, in the "Employment Contract", that service providers are responsible to ensure that all (contracted) staff be adequately trained in environmental, health and safety issues prior to commencing work.

6.2.4 Training Management Plan and Schedule

A sample procedure for training, awareness and competence is provided in Table B.6 in Appendix B. In customizing this procedure for your municipality take into account existing training programs in place at your facility. The sample procedure references a summary of training requirements, which is provided in Tables B.7 and B.8 in Appendix B. Table B.9 lists some additional environmental training requirements that could be considered.

In order to demonstrate that the municipality is meeting its assigned training schedule and/or requirements, a Training Acknowledgment form should be completed. The signed-off Training Acknowledgement Form could also be used as the attendance list. A sample Training Acknowledgment Form is provided in Table B.10 in Appendix B. It should be noted that the completion of follow up refresher courses should also be documented.

6.2.5 Registration Hints

With regards to training, awareness and competence, Registrars typically focus on the following issues:

- how new employees (or employees assuming new in-house duties) are trained with regards to legislative and overall EMS requirements;
- the appropriateness of the training provided to address one or two sample significant environmental aspects;
- the role of contractors and how the municipality has considered their training needs within the training program; and
- the cycles for re-training (assessment of who needs what and the fulfillment of on-going requirements)

6.3 Communications

6.3.1 Reference in ISO 14001

ISO 14001 requires that formal procedures for communications be set up. Communications include establishing processes to report internally between various levels and functions of the municipality, and receiving, documenting and responding to relevant communication from external interested parties. In some circumstances, responses to interested parties' concerns may include relevant information about the environmental impacts associated with specific waste management operations. The specific requirements of ISO 14001 are as follows:

Clause 4.4.3 Communications

With regard to its environmental aspects and environmental management system, the organization shall establish and maintain procedures for

1. *internal communications between the various levels and functions of the organization;*
2. *receiving, documenting and responding to relevant communication from external interested parties.*

The organization shall consider processes for external communication on its significant environmental aspects and record its decision.

It should be noted that ISO 14001 does not provide a definition for "relevant communications", which broadly refers to communication that relates directly to environmental aspects or hazardous situations or regulatory compliance. The term "interested parties" typically includes, but is not limited to regulators, customers, public interest groups, and suppliers.

The following sections address internal and external communication.

6.3.2 Internal Communications

A key component of EMS communications and review procedures is to ensure that an adequate internal communications system is in place to support continual improvement pertaining to environmental issues. The procedure is also required to address internal communications in the event of an emergency as well as reporting potential environmental hazards. In developing a procedure for the waste management department, you should consider the following questions:

- What is the setup of the existing communications structure?
- How are the results of the EMS Gap Analysis or Audit communicated between various levels and functions of the organization?
- What is the process for receiving and responding to internal employee concerns?
- What are the types of information to be disseminated?
- What types of information should remain confidential?
- What are the appropriate methods for distributing information?
- How should emergencies be reported (and integrated with emergency response procedures)?
- How are procedural changes communicated?

Emergency preparedness and response procedures are discussed in further detail in Section 6.6 of the Guide.

- Internal communications may consist of meetings, newsletters, e-mail updates, bulletin board postings, reward and award programs, and information sessions.

A sample procedure for internal communications is outlined in Table B.11 in Appendix B. Sample schedules for reporting and investigating hazards and emergency investigation tracking are provided in Tables B.12, B.13 and B.14.

6.3.3 External Communications

A procedure for tracking external communications is required by ISO 14001. The procedure should outline appropriate handling and response methods for receiving, documenting and responding to external communications under normal operations and emergency conditions. The records that should be maintained for external inquiries includes letters received from external parties, a log of all complaints received, and the response or follow-up from the municipality. In developing this procedure, the following should be considered:

- existing external communications (e.g. Annual Reports, correspondence with government regulators, public announcements, etc.);
- the requests for information that are likely to be received from outside parties (e.g. regulators, etc.) and who should be responsible for responding;
- who should report emergency conditions (e.g. who will call the MOE Spills Action Centre);
- who communicates information related to emergency planning to the fire department and other emergency services;
- who will communicate environmental requirements to suppliers and contractors;
- who has the authority to release information to the public; and
- types of information that are not to be communicated externally.

External communications procedures should also identify whether and how the municipality will communicate information on significant environmental aspects. The standard does not require that environmental aspects be communicated, however it does require that the decision that is made on this matter be documented. Top management is

ultimately responsible for deciding if the municipality's significant environmental aspects should be communicated to the public.

If significant environmental aspects are communicated to the public it would probably be advisable to also communicate information on the municipality's environmental objectives and targets and on environmental programs aimed to address these aspects.

6.3.4 Registration Hints

A Registrar will review external and internal communications procedures. Ensure that the municipality documents its decision with respect to publicizing (specific or all) significant environmental aspects. If the municipality has decided to make this information public, the Registrar will expect to see evidence of this process.

Make sure that the external communication procedure to receive, document and respond to inquiries is clearly understood and followed (this is particularly important if your facility does not receive many external inquiries). The Registrar will likely interview selected staff to confirm their understanding of the procedure. Staff that may be interviewed include those individuals that the public may have first contact with such as administration staff, receptionist(s), and security guards.

With regards to internal communications procedures, be prepared to provide meeting minutes confirming that internal discussion about this procedure has occurred. Ensure that documentation is available to confirm that the municipality has periodically reviewed the internal communications programs to ensure that they are adequate. It would also be beneficial to have on file documented approval from legal counsel regarding your internal and external communications procedures.

6.4 EMS Documentation and Document Control

6.4.1 Reference in ISO 14001

In order to conform to a standardized procedure, documentation must be prepared to demonstrate that the requirements of the standard are being met. The specific requirements of ISO 14001 with respect to documentation are:

Clause 4.4.4 Environmental Management System Documentation

The organization shall establish and maintain information, in paper or electronic form to,

1. *describe the core elements of the management system and their interaction;*

2. *provide direction to related documentation.*

6.4.2 EMS Documentation

The size and complexity of the EMS documentation depends on the size and complexity of your waste management operations. EMS documentation consists of documents and records. Examples of documents include the Environmental Policy, internal and external standards, regulatory permits, standard operating procedures, compliance audit procedures and emergency response plans. Records identify the outcome or results of a specified task or activity. Unlike a document, a record provides descriptive information and is not used to control daily operations.

The EMS documentation should include the following:

- an overview of the management system including a review of operational procedures;
- a statement of the Environmental Policy;
- description of significant environmental aspects, impacts, objectives and targets
- general summary of the environmental management structures roles and responsibilities;
- identification of related documentation (e.g. MSDS);
- overview of monitoring and measuring programs;
- description of environmental training programs (including listing of acknowledgment forms);
- summary of internal and external communication procedures including emergency response procedures;
- description of EMS audit procedures and management review process; and

- overview of documentation control and distribution procedures (including a record of revisions).

6.4.3 Document Control Systems

ISO 14001 requires that documents be created and maintained in a manner sufficient to implement the EMS. Characteristics of documents include written information that is referred to on a regular basis during normal operations in order to address procedural requirements. Documents must be updated on a regular basis in order to be effective.

The specific ISO 14001 requirements are as follows:

Clause 4.4.5 Document control

The organization shall establish and maintain procedures for controlling all documents required by this International Standard to ensure that

1. *they can be located;*
2. *they are periodically reviewed, revised as necessary and approved for adequacy by authorized personnel;*
3. *the current revisions of relevant documents are available at all locations where operations essential to the effective functioning of the environmental management system are performed;*
4. *obsolete documents are promptly removed from all points of issue and points of use, or otherwise assured against unintended use;*
5. *any obsolete documents retained for legal and/or knowledge preservation purposes are suitably identified.*

Documentation shall be legible, dated (with dates of revision) and readily identifiable, maintained in an orderly manner and retained for a specified period. Procedures and responsibilities shall be established and maintained concerning the creation and modification of the various types of document.

Document control systems can be computer-based or paper-based, as well as centralized or distributed. Effective document control will assist to ensure that all employees have access to key documents when they need them.

A sample procedure for document control is provided in Table B.15 in Appendix B. Table B.16 provides a sample schedule for the procedure that lists documents, their location, revision, revision schedule, and retention procedures. Documentation retention requirements should be determined, as appropriate, by your municipality (e.g. may not be necessary to retain obsolete EMS documents for extended periods of time). It should be noted that external documents (e.g. Certificates of Approvals) could also be included with your schedule, even though they were not included in the sample schedule provided.

6.4.4 Registration Hints

In developing and implementing document control, the municipality should emphasize retaining current copies of all internally and externally prepared documents and ensure that obsolete copies are discarded. The Registrar typically enquires about back-up documentation responsibilities (in the event that someone included in the document control process is away from the facility for an extended period of time). Furthermore, ensure that records are available to show that the municipality does periodically review and update the documents where necessary. Registrars will likely be interested in reviewing the records management procedure to determine if key compliance or EMS records have been missed, or wrongly identified.

6.5 Operational Control

6.5.1 Reference in ISO 14001

The specific requirements of ISO 14001 with respect to operational control are as follows:

Clause *4.4.6 Operational control*

The organization shall identify those operations and activities that are associated with the identified significant environmental aspects in line with its policy, objectives and targets. The organization shall plan these activities, including maintenance, in order to ensure that they are carried out under specified conditions by

1. *establishing and maintaining documented procedures to cover situation where their absence could lead to deviations from the environmental policy and the objectives and targets;*

2. *stipulating operating criteria in the procedures;*

3. *establishing and maintaining procedures related to the identifiable significant environmental aspects of goods and services used by the organization and communicating relevant procedures and requirements to suppliers and contractors.*

6.5.2 Identification of Requirements for Operational Control Procedures

Municipal waste management operations may include collection, handling, processing, storage, disposal and transfer of wastes, maintenance processes, and pollution control equipment. EMS related activities are typically divided into three categories:

- activities to prevent pollution and conserve resources;
- daily management activities to ensure conformance to internal and external requirements; and
- strategic management activities to anticipate and respond to changing environmental requirements.

As previously noted, the identification of requirements for operational procedures involves:

- reviewing significant environmental aspects and legal requirements;
- creating an inventory of all operations and activities that could have a significant impact on the environment if not conducted properly; and,

The results of this analysis will be the waste management system's inventory of critical activities and operations that require documented operational procedures.

Once critical activities and operations are identified, the next step is to develop documented procedures to address their environmental impacts. These procedures relate to items such as:

- handling and storage of fuels, chemicals, etc to prevent spills from tanks, drums, delivery vehicles;
- air pollution control equipment maintenance to minimize releases of air emissions; leachate management; and
- landfill gas collection.

Procedures should include names of contacts to notify if/when procedures go off track. Many municipalities already have procedures in place to control these items. Where appropriate these procedures should be incorporated into the ISO 14001 EMS.

Appropriate staff should be designated with the responsibility for preparing operational procedures. More specifically, operations, facilities and maintenance personnel should be involved, as staff in these positions will most likely be responsible for executing some of the operational procedures.

Clause 4.4.6 does not specify content requirements of operational procedures, except that they must contain "operating criteria". Typically, operational procedures include some of or all of the following information:

- purpose of the procedure;
- the area of the facility the procedure applies to;
- definitions of terms or phrases;
- an overall goal statement;
- a step-by-step outline of how the operation or activity is to be completed;
- the identification of who is responsible to execute the tasks;
- reference to related documents or records to be completed as part of the operation; and
- the type of training required for personnel identified in the procedure.

Ensuring that staff has the appropriate training is part of operational control. The standard also requires that operational controls be in place to address impacts related to contractors

and suppliers *("aspects. it can control and over which it can be expected to have an influence)*. The operational control procedures may be related to such issues as management of waste by on-site contractors, restrictions on chemicals/materials allowed on-site and temporary storage of materials/chemicals.

6.5.3 Registration Hints

The objective of the Registrar is to determine if the municipality has in fact set up appropriate operational control procedures that help avoid or minimize environmental impacts. The Registrar will more than likely assess the practicality of the EMS by determining if employees are following facility operational control procedures. Similarly the Registrar may also follow up with a few contractors and suppliers in order to determine if your facility informed them of operational procedures that they are expected to follow.

6.6 Emergency Preparedness and Response

6.6.1 Reference in ISO 14001

The requirements of the standard with respect to emergency preparedness and response are:

4.4.7 Emergency preparedness and response

The organization shall establish and maintain procedures to identify potential for and respond to accidents and emergency situations, and for preventing and mitigating the environmental impacts that may be associated with them.

The organization shall review and revise, where necessary, its emergency preparedness and response procedures, in particular, after the occurrence of accidents or emergency situations.

The organization shall also periodically test such procedures where practicable.

6.6.2 Emergency Response Procedures

The standard requires that emergency response procedures be prepared. If properly prepared the procedure delegates authority, opens the lines of communication between

your "in-house" first responders and the local fire department, police and any regional/industry response team that may be available.

Most emergency response procedures include the following components:

- a roster of emergency-response telephone numbers;
- the roles and responsibilities of all responding parties;
- a list of technical resources (including blueprints, databases, maps and other information) required to analyze municipal hazards and respond to every contingency;
- emergency-response, clean-up and containment measures;
- documentation of investigation and follow up procedures (to find out what went wrong and take steps to ensure it will not happen again); and,
- measures to test and update the procedure.

The emergency response procedure should include an up-to-date list of appropriate internal and external resources. External resources include, ambulance services, chemical information hotlines, spill clean up services, government regulatory agencies, the media, and spill reporting centres. Some internal contacts may include contacts from key areas of the municipality such as the legal, security, health and safety, and public relations departments.

To meet the requirements of the standard, the municipality will need to examine operations to determine what potential accidents or emergency situations might occur, and develop procedures to prevent and mitigate environmental impacts and respond to situations as they arise. Both the procedures and responses need to be reviewed after an incident to ensure that the risk of future incidents is reduced. In developing a procedure or reviewing an existing emergency response procedure the following should be established:

- What types of emergencies could occur (fire, spill, gas leak, failure of pollution control device, process equipment breakdown, floods, heavy snow etc.)?
- What operations and activities might cause an accident or emergency situation?
- How is the potential for emergencies identified and in what area?

- Who is responsible to identify emergencies?
- What types of emergencies have historically occurred?
- Who will respond (on-site team members, commercial clean-up company, fire department)?
- Who will prepare the emergency response plan?
- Who will direct the response and how they can be contacted?
- How will off-site impacts be minimized? What on-site equipment will be required?
- What training will be required?
- What size of spill constitutes an emergency?
- What paperwork will be required?
- What follow-up will be conducted?
- How often do drills / tests occur and in what areas?
- Who is responsible to initiate the drills / tests?
- When is evacuation necessary?
- Who will have contact with public, regulatory officials, fire department, etc.?
- How will the procedure be integrated with local fire department and other emergency services?
- How will the response be evaluated and improvement made?

If your municipality does not currently have an emergency response procedure, reference the CSA document entitled: CAN/CSA-Z731-95, *Emergency Planning for Industry, Major Industrial Emergencies, A National Standard of Canada,* 1995 (available from CSA International). The standard establishes the minimum criteria for emergency planning and provides guidance for developing an effective emergency preparedness and response plan.

A sample emergency response procedure and a sample environmental incident report are provided in Tables B.17 and B.18 in Appendix B.

6.6.3 Review and Testing

The standard requires that organizations establish a formal procedure to test emergency and response procedures "where practicable." It is important to note the meaning of the word practicable - that which is capable of being put into practice. This term is used in the standard as it has more strength than the term practical, which implies a consideration of convenience.

It is recommended that semi-annual or quarterly drills be conducted. In addition, records of the review and testing process should be included in the record management system. Testing response procedures should be prepared to outline the requirements of fire drills, mock spill exercises, worker evacuation drills, testing of equipment alarms, early warning equipment, and automated controls. A municipality may also choose to utilize alternative testing mechanisms to drilling (e.g. interview employees to assess knowledge of response required and record results).

Although the ultimate goal is to avoid emergencies, accidents with potential impacts do occur. Appropriate emergency procedures and training can prevent an incident from having a major environmental impact.

6.6.4 Registration Hints

If your municipality has had emergency events in recent years the Registrar is more likely to review written reports pertaining to the facility's response. Similarly the Registrar will probably determine if noted recommendations were in fact implemented, and if not, whether documentation exists to explain why not.

The Registrar will want to see evidence that the municipality has considered its potential emergency situations and has reviewed prevention, mitigation and response requirements/methods (in accordance with the requirements of Clause 4.4.7).

In addition, the Registrar typically interviews employees to determine if emergency response procedure training has been provided and if they have a full understanding of their assigned tasks.

7.0 CHECKING AND CORRECTIVE ACTION (ELEMENT 4.5)

A significant requirement of the standard is establishing and maintaining a documented procedure to periodically evaluate compliance with relevant environmental legislation and regulations and EMS objectives and targets. Effective components of checking and corrective action include monitoring and measuring performance, reporting and records, and an EMS audit.

7.1 Reference in ISO 14001

The requirements of the standard with respect to monitoring and measuring are:

4.5.1 Monitoring and measurement

The organization shall establish and maintain documented procedures to monitor and measure, on a regular basis, the key characteristics of its operations and activities that can have a significant impact on the environment. This shall include the recording of information to track performance, relevant operational controls and conformance with the organization's environmental objectives and targets.

Monitoring equipment shall be calibrated and maintained and records of this process shall be retained according to the organization's procedures.

The organization shall establish and maintain a documented procedure for periodically evaluating compliance with relevant environmental legislation and regulations.

7.2 Monitoring and Measurement

The integrity of an EMS depends upon monitoring and measuring to verify that the procedures, programs and operational controls prepared to handle and control environmental impacts are in fact being implemented in conformance with the requirements of ISO 14001. Monitoring is required in order to ensure that environmental objectives are on track, and activities that have the potential to cause significant impacts are controlled. Table 7.1 provides examples of items that require monitoring:

TABLE 7.1

IDENTIFYING MONITORING AND MEASURING REQUIREMENTS

SIGNIFICANT OR POTENTIALLY SIGNIFICANT ENVIRONMENTAL ASPECT	ASSOCIATED ACTIVITY	MONITORING REQUIRED	PROCEDURE REQUIRED
Electrical, Natural Gas, Diesel and Water Consumption	General Facility Operations	monthly review of electrical, natural gas and water bill to identify any increases or anomalies	Utility Consumption Monitoring Procedure
Wastewater discharge	On-site leachate treatment plant	daily monitoring of pH daily monitoring of BOD	Leachate Treatment Plant Monitoring Procedure
Air Emissions	Energy from Waste Facility	daily monitoring of pressure drop across baghouse	Air Pollution Control Preventive Maintenance Procedure
Methane generation	Landfilling operations	continuous monitoring of methane	Procedure for monitoring sub-surface migration of landfill gas

When establishing impacts to be monitored, remember that the standard states that monitoring should be conducted for "key characteristics" of the operation. Therefore, it is important to ensure that critical parameters are monitored, and that data required for ensuring objectives and targets is also monitored.

Monitoring and measurement can be conducted through the use of process monitors, routine inspections, interviews with responsible persons, review of records, and review of other outputs of procedures. When preparing the monitoring procedures, keep in mind that a requirement for calibrating and maintaining the equipment needs to be included.

This section of the standard also requires a procedure to address periodic evaluation of compliance. For example, a municipality that operates a landfill may require a procedure for leachate monitoring.

Operational procedures for monitoring and measurement are required to address operations and activities that can have a significant impact on the environment. These

operational procedures should describe the roles, responsibilities and authorities for monitoring and measurement. The types of information to be gathered and recorded to enable your municipality determine the overall effectiveness of its EMS in controlling significant environmental issues should be specified.

Clause 4.5.1 of the standard states that the organization shall *"...establish and maintain a documented procedure for periodically evaluating compliance with relevant environmental legislation and regulations."* The scope will depend on the environmental regulatory issues applicable to your municipality, however organizations frequently use environmental compliance audits to fulfill this requirement. It should be noted that the environmental compliance audit is separate from the EMS audit to be discussed in Section 7.5 of the Guide. Typically, an environmental compliance audit procedure describes your facility's approach for conducting the audit (e.g. written protocols or checklists), evaluating and reporting audit findings, and correcting identified compliance procedures. Table B.19 in Appendix B provides a sample of a standard operating procedure for conducting compliance audits. The compliance audit should be conducted by individuals who are independent of the process they are auditing (e.g. either internal staff or an external consultant).

7.3 Nonconformance and Corrective and Preventive Action

Nonconformances typically include a policy or practice contrary to the requirements of the applicable standard or documented procedure. Failure to identify and correct non-conformances can have serious consequences with respect to ISO 14001 Registration status. Non-conformances include deficiencies to fulfill a specified EMS requirement. Examples of typical causes of non-conformances include:

- missed objectives and targets;
- missed significant environmental aspects (not necessarily objectives and targets);
- ineffective procedures; an incident / accident (an incident / accident does not lead to a nonconformance unless one or more of the standard requirements associated with the incident have been missed);
- insufficient documentation to evaluate conformance with the EMS;
- failure to meet one or more of the standard requirements;

- failure to appropriately communicate to the cross functional elements of the municipality; and
- lack of understanding of the requirements.

Both corrective and preventive action requires an identification of a root cause. Corrective actions are steps taken to rectify a nonconformance, and would include mitigation of any environmental impact caused. Examples of corrective actions include placing protective barriers around a storm drain in an area where liquid hazardous wastes are being unloaded, or labeling an unlabelled hazardous waste drum. Preventive actions address the root causes of the nonconformance, and often involve revisions to current procedures or processes or, the development of new ones. Preventive actions may include revising the training program, creating procedures for hazardous waste management or installing prevention equipment such as overfill alarms.

In order to address any nonconformance and corrective and preventive action, there is a requirement that there be clearly established procedures to define responsibility and authority. The specific requirements of the standard are:

4.5.2 Nonconformance and Corrective and Preventive Action

The organization shall establish and maintain procedures for defining responsibility and authority for handling and investigating nonconformance, taking action to mitigate any impacts caused and for initiating and completing corrective and preventive action.

Any corrective or preventive action taken to eliminate the causes of actual and potential non-conformances shall be appropriate to the magnitude of problems and commensurate with the environmental impact encountered.

The organization shall implement and record any changes in the documented procedures resulting from corrective and preventive action. A sample procedure for handling nonconformance and taking corrective and preventive action is provided in Table B.20 in Appendix B. It should be noted that corrective and preventive action may trigger changes to procedures as well as the need for new or revised training requirements.

There are two recognized types of nonconformances. A major nonconformance is a serious deficiency in the EMS that adversely effects the operation/effectiveness of an EMS. Minor nonconformances are isolated deficiencies that do not affect the

performance of an EMS in its entirety. Addressing a nonconformance through a formal corrective and preventive action process depends on whether it is simply an isolated problem, or a system-related problem that will recur and continue to impact the overall effectiveness of the EMS. Prior to making this determination, the severity and persistence of the problem must be reviewed, as well as the overall impact to the environment. A corrective and preventive action program typically includes the following formalized processes:

- identification of potential nonconformance;
- completion of a nonconformance report;
- identification of potential root cause;
- investigation of appropriate corrective action(s);
- implementation of (selected) solution; and
- review of effectiveness of corrective action.

Nonconformance reports provide a practical method for tracking and evaluating nonconformances and corrective actions. A nonconformance report typically includes the following four sections:

Section 1 - describes the nonconformance;

Section 2 - summarizes the root cause of the problem;

Section 3 - describes the required corrective actions;

Section 4 - confirms that the corrective action has been completed and the issue has been appropriately dealt with.

It is also common for the nonconformance report to reference the ISO 14001 clause that the nonconformance is associated with. Table B.21in Appendix B provides a sample nonconformance report.

7.4 Reporting and Records

Record keeping is also an essential component of ISO 14001. Procedures are required to identify, maintain and dispose environmental records. They must be stored and maintained in such a way that they are readily retrievable, protected against damage, and retained for a specified length of time. The specific requirements of the standard are:

Clause 4.5.3 Records

The organization shall establish and maintain procedures for the identification, maintenance and disposition of environmental records. These records shall include training records and the results of audits and reviews.

Environmental records shall be legible, identifiable and traceable to the activity, product or service involved. Environmental records shall be stored and maintained in such a way that they are readily retrievable and protected against damage, deterioration or loss. Their retention times shall be established and recorded. Records shall be maintained, as appropriate to the system and to the organization, to demonstrate conformance to the requirements of this International Standard.

Typically, records include environmental approvals, training records, results of inspections, monitoring records, audit results, correspondence with regulatory officials, waste manifests and numerous other environment related paperwork.

A sample procedure for record management is provided in Table B.22 in Appendix B. In revising this procedure to make it applicable to your municipality, the following should be considered:

- who will be responsible for maintaining environmental records;
- where will the records be kept; and
- how long should records be kept.

A preliminary list of records requiring management is provided in Table B.24 in Appendix B. This schedule of records is referenced in the sample procedure for record control and can be used as a starting point to establish your own list of records to be managed. The record keeping system is intended to assist an organization to both meet the requirements of ISO 14001 and to demonstrate due diligence.

7.5 EMS Audit

The EMS audit systematically verifies if the EMS developed to date, has in fact been properly implemented and maintained in accordance with the requirements of the standard. The audit verifies if the EMS conforms to the requirements of the Environmental Policy, and overall objectives and targets. The measuring, monitoring and evaluation of performance is generally fulfilled through formal internal and external EMS audits. The specific requirements of the standard are:

Clause 4.5.4 ***Environmental management system audit***

The organization shall establish and maintain (a) programme(s) and procedures for periodic environmental management system audits to be carried out, in order to

a) determine whether or not the environmental management system

b) conforms to planned requirements of this International Standard; and

c) has been properly implemented and maintained; and

d) provide information on the results of audits to management.

The organization's audit programme, including any schedule, shall be based on the environmental importance of the activity concerned and the results of previous audits. In order to be comprehensive, the audit procedures shall cover the audit scope, frequency and methodologies, as well as the responsibilities and requirements for conducting audits and reporting results.

The EMS audit has two main goals. First, the audit should verify that appropriate procedures and processes to meet the established environmental objectives, targets and EMS goals are in place. Second the audit should confirm that what is stated in your policy and procedures is in fact practiced. This is typically determined via interviews, sampling and/or direct observation. The audit assists in determining voids within the current EMS, and ultimately provides a benchmark that can be used to compare improvements over a specific period of time.

The EMS audit procedure should address:

- audit frequency and schedule;

- identification of Auditor(s);
- physical locations and organizational activities to be included;
- notification of the audit;
- responsibilities associated with conducting and managing the audit;
- auditor training (if required);
- confidentiality requirements; and
- communication of audit results.

It is important to ensure that the EMS audit program addresses all the functional elements of the EMS and that Senior Management is involved in the audit process. ISO 14012 entitled "Guidelines for Environmental Auditing - Qualification Criteria for Environmental Auditors" provides guidance on the qualification of auditors and can assist municipalities to select an internal or external auditor.

It is important to ensure that system nonconformances identified during the EMS audit are addressed through the nonconformance and corrective and preventive action process.

The frequency and method for conducting audits will depend upon the size and scope of the activities at the facility, the number of action items identified in previous audits, as well as past performance. A sample procedure for an EMS audit is provided in Table B.24 in Appendix B. In this sample procedure an annual internal audit of the system and an external audit every three years is suggested.

7.6 Registration Hints

With respect to the monitoring and measurement program, the Registrar may focus on the municipality's efforts to develop formal systems that appropriately examine activities and complex operational procedures that may involve significant environmental aspects. The Registrar may attempt to determine the effectiveness of the municipality's control of its significant environmental aspects and impacts, as well as the progress in meeting overall environmental objectives and targets.

It is not uncommon that environmental compliance audits are confidentially programs. Registrars are still able to review confidential compliance audits if precautions are

maintained by documenting the need for the review by the Registrar (and ensure that your legal advisor is made aware that the Registrar may review the audit). Similarly, any advice obtained by the Registration Auditor has to be regarded under the same level of confidentiality.

The Registrar may attempt to test the corrective and preventive action process in order to identify examples of nonconformances in your EMS. The proper functioning of this process will be determined upon review of your monitoring and measurement program as well as the EMS audit results. The Registrar may randomly select a sample nonconformance and you could be required to walk through the process of how the non-conformance was resolved. It is common for the Registrar to interview staff involved in the resolution process and review the procedures that required amended. The Registrar will attempt to ensure effective closure of any nonconformances.

Regarding the EMS audit, the Registrar typically requests evidence that the results of the audit have been communicated and discussed with Senior Management. More than likely, Senior Management will be interviewed to determine if they are in fact aware of the results of the EMS audit.

8.0 MANAGEMENT REVIEW (ELEMENT 4.6)

As discussed in the previous section, an EMS audit is an analysis to establish if the system itself is working as designed. A Management Review on the other hand, strategically determines if the EMS is appropriate to address the activities, products, and services of the organization and the corresponding environmental aspects and impacts.

8.1 Reference in ISO 14001

In order to ensure continual improvement, conformance to the Environmental Policy and effectiveness of the EMS, it is necessary for management to review and evaluate the EMS at defined intervals. The specific requirements of the standard are:

Clause 4.6 Management Review

The organization's top management shall, at intervals that it determines, review the environmental management system, to ensure its continuing suitability, adequacy and effectiveness. The management review process shall ensure that the necessary information is collected to allow management to carry out this evaluation. This review shall be documented.

The management review shall address the possible need for changes to policy, objectives and other elements of the environmental management system, in the light of environmental management system audit results, changing circumstances and the commitment to continual improvement.

Ideally, the management review of the EMS should be integrated with management's review of the facility's overall business operations. This would involve reporting on the EMS in a similar manner, with the same schedule, and during the same meetings. Formal and informal reporting, presentations, and the communication of ad hoc information may also form part of the municipality's management review process.

8.2 Key Elements to be Included

The overall goal of the Management Review is to determine if the EMS is functioning in the manner in which it was intended. Therefore the Management Review could address the following elements:

- Are the environmental objectives and targets being achieved?
- Have the significant environmental aspects been identified?
- Is our Environmental Policy being honoured? Is the Policy still appropriate to the scope and nature of our activities?
- Is the EMS comprehensive enough?
- Are we using our resources appropriately?
- Is the monitoring and measuring program effective?
- Did we have any environmental incidents?
- Is the nonconformance and corrective and preventive action program effective?
- Are our procedures clear and adequate?
- Is the EMS audit program effective?
- What do the results of the audit tell us?
- What are the areas of noncompliance?
- Are stakeholder concerns adequately addressed?
- Is there any new external stakeholder concerns?
- What else can we do to improve?
- What are the environmental trends?
- Should the EMS be modified to match changing operational needs?
- Is the EMS providing the expected benefits?

8.3 Issues to Consider

The standard requires that the results of the review be documented but does not require that any set procedure be followed or dictate how often the review should be conducted. Thus the review can range from a documented meeting of the management team and the

environmental committee to a formalized report reviewing the items noted above or any other relevant issues.

The EMS Project Coordinator (or equivalent) should be designated with the responsibility of ensuring that the"*...necessary information is collected to allow management to carry out the evaluation...*" as required by Clause 4.6. This information may include identifying current and emerging environmental issues that may affect waste management operations.

Some issues to consider when deciding on the structure of the Management Review include how the review process will be conducted (e.g. meetings, reports, presentations, ad hoc reviews) and when it will be conducted (e.g. scheduled quarterly, annually, formal or informal). In accordance with the requirements of ISO 14001, Top Management must be involved in the review process. It is recommended that the names of attendees, items discussed, and action items assigned during the meeting be documented. In this way, corrective actions resulting from the Management Review can be formally integrated in the corrective and preventive action program already in place. A generic Management Review Record is provided in Table B.25 in Appendix B. It should be noted that any records generated must be managed in accordance with ISO 14001's record management requirements.

8.4 Registration Hints

It is important that the Registrar is provided with evidence that the management review process has been implemented and most importantly that Top Management undertook the review. The Registrar may request to review Management Review Records, identify a specific action resulting from the process, and then follow up to assess if changes have been made or are in the process of being made. In cases where a municipality is using EPIs to track the performance of the EMS, the registrar may review how management uses these in the review process.

9.0 BRIEF OVERVIEW OF THE REGISTRATION PROCESS

It is important to understand that it will be your municipality's EMS that undergoes the ISO 14001 registration and not the overall facility. More specifically, during the registration process a third party (e.g. the Certification body / the Registrar) will determine if your EMS has demonstrated acceptable conformance with the requirements of the standard. If your municipality decides to pursue registration, the initial steps consist of the following:

- Identify the facility and scope of the operations to be registered and conduct an initial review of current EMS practices, processes and procedures to evaluate initial level of conformance.

- Select an accredited Registrar to conduct the assessment of the facility's EMS. Gather all appropriate EMS documentation to be reviewed by the registrar in advance of the actual on-site assessment. The documentation review may be conducted on or off-site (this will be decided by the registrar). A documentation review ensures the planned system meets the requirements of the standard.

- Have the Registrar conduct a pre-assessment allowing them to gain an initial understanding of facility operations and have an initial look at the functioning of the EMS. It should be noted that a pre-assessment is optional but recommended in most cases. A benefit of a pre-assessment is that it provides the Registrar an opportunity to become familiar with your municipality in preparation for the up-coming implementation assessment. Clarification of upcoming processes is possible while reviewing documentation.

- Have the Registrar visit the facility to conduct the assessment. The length of the assessment will depend on the size and complexity of the facility or facilities. During this time, the Registrar will interact with designated facility personnel as well as interview staff, conduct inspections and review EMS documentation.

- The results of the EMS assessment will be reviewed with on-site personnel and the EMS Auditors. If approved, the facility's EMS has demonstrated acceptable conformance with the ISO 14001 standard. If conditional approval is granted this means that the facility's EMS has minor non-conformances that should be easily resolved within a specified time frame. If the facility's EMS is disapproved this

implies that the EMS has not demonstrated conformance with basic elements of ISO 14001.

- The Registrar will conduct surveillance audits on a semi-annual or annual basis (depending on the specific requirements of the Registration body).

Most organizations obtain third-party registration of their EMS in order to obtain assurance both internally and for external stakeholders that their EMS is consistent with ISO 14001. Nonetheless, the standard does make provision for self-declaration although it provides no formal guidance on the self-declaration process, or details on what kind of public statements (if any) should be made by a facility.

A municipality may wish to pursue ISO 14001 registration when the following criteria are met:

- The EMS has been operational for a minimum of three to six months;
- The internal audit system is operational and effective;
- At least one management review has been conducted;
- All identified non-conformities have been addressed;
- Justified confidence that compliance program is effective;
- The principle of "continual improvement" is adhered to;
- Staff are aware of environmental effects, objectives and EMS; and
- Key staff has received appropriate training.

10.0 ADDITIONAL USEFUL INFORMATION

This section provides additional information that may be helpful to municipalities. The information includes an outline of the ISO 14000 Series of documents, a description of ISO 14001 software, a list of associations and agencies, prevention of pollution/environmental management guidance documents, and references.

10.1 ISO 14000 Series – Guidance Documents

The ISO 14000 environmental management system standards include a series of guidance documents. Unlike the 14001 standard, to which an organization can be audited, these documents provide guidance on how to implement an EMS and include:

14004 Environmental Management Systems/ Guidelines on Principles, Systems and Supporting Techniques

Provides assistance to organizations initiating, implementing, or improving an EMS. This document outlines the elements of an EMS and provides practical advice on implementing or enhancing such a system. The EMS principles include identification of applicable regulatory requirements, commitment to continual improvement and evaluating environmental performance on a regular basis.

14010 Guidelines for Environmental Auditing / General Principles

Provides guidance to organizations, auditors and clients on the general principles necessary to conduct audits.

14011 Guidelines for Environmental Auditing / Auditing Procedures

Provides guidance to organizations on how to establish and continue to meet their environmental policies, objectives, standards and requirements. Audit procedures are established for planning and performing an audit of an EMS to determine whether or not conformance is being achieved using the EMS audit criteria.

14012 Guidelines for Environmental Auditing / Qualification Criteria for Environmental Auditors

Addresses the qualification requirements for auditors and lead auditors, which is also applicable to both internal and external auditors.

A list of the documents in the ISO 14000 series is provided in Table 10.1.

10.2 ISO 14001 Software

A number of environmental computer software development companies have introduced environmental management and performance evaluation software. EMS software provide a standardized format for the EMS documentation and records and are relational databases that can help link environmental aspects, impacts, regulatory requirements, objectives and targets. The majority of software that is available can be customized to better suit a particular client's needs.

Following are some examples of the EMS software currently available on the market:

Greenware Environmental System
Contact: Rob Ganzhorn
rob@greenware.com
Phone: (416) 363-5577
Fax: (416) 367-2653

Intellex Technologies Inc.
Contact: Michael Hornick
michael.hornick@intelex.com
Phone: (416) 679-0119
Fax: (416) 679-0168

Envirowin Software Inc.
Contact: Paul Krumenacker
info@envirowin.com
Phone: (312) 255-8900
Fax: (312) 255-8901

Table 10.1
The ISO 14000 Family of Standards

Environmental Management System		
Designation	*Publication*	*Title*
ISO 14001	1996	Specification with guidance for use
ISO 14004	1996	General guidelines on principles, systems and supporting techniques
Guidelines for Environmental Auditing		
Designation	*Publication*	*Title*
1SO 14010	1996	General Principles on Environmental Auditing
ISO 14011	1996	Audit procedures – Auditing of environmental management systems
ISO 14012	1996	Qualification criteria for environmental auditors
ISO/CD 14015	To be determined	Environmental assessment of sites and organizations
Environmental labels and declarations		
Designation	*Publication*	*Title*
ISO 14020	1998	General principles
ISO 14021	1999	Self-declared environmental claims - Terms and Definitions
ISO 14024	1999	Type l environmental labelling – Guiding Principles and procedures
ISO//TR 14025	2000	Type lll environmental declarations – Guiding principles and procedures
Environmental Management – Environmental Performance Evaluation		
Designation	*Publication*	*Title*
ISO 14031	1999	Guidelines
ISO/TR 14032	1999	Case studies illustrating the use of ISO 14031
Environmental Management – Life Cycle Assessment		
Designation	*Publication*	*Title*
ISO 14040	1997	Principles and framework
ISO 14041	1998	Goal and scope definition and inventory analysis
ISO 14042	2000	Life cycle impact assessment
ISO 14043	2000	Life cycle interpretation
ISO/WD TR 14047	To be determined	Examples of application of ISO 14042 (future technical report)
ISO/CD 14048	To be determined	Life Cycle Assessment - Life cycle assessment data documentation
ISO/TR 14049	2000	Examples of application of ISO 14041 to goal and scope definition and inventory analysis
Environmental Management – Vocabulary		
Designation	*Publication*	*Title*
ISO 14050	1998	Vocabulary
Guide for the Inclusion of Environmental Aspects in Product Standards		
ISO Guide 64	1997	Guide for the inclusion of environmental aspects in product standards

Note:
CD = Committee Draft
WD = Working Draft
TR = Technical Report

Source: www.TC207.org

Quality Mapping Solutions
Contact: Peter Saracino
info@qmsonline.com
Phone: 1-888-786-3133
Fax: 1-810-786-0088

Caribou Systems Corporation
Contact: Gregg Fleet
info@caribousystems.com
Phone: (416) 561-9392
Fax: (416) 366-3592

10.3 Associations / Agencies

The International Council for Local Environmental Initiatives (ICLEI), which has its World Secretariat in Toronto, has been involved in the development of environmental management systems for municipalities for a number of years. The address for this agency is:

ICLEI-World Secretariat
City Hall, East Tower, 8th Floor
Toronto, ON, M5H 2N2, Canada
Telephone: 416 392 1463
Fax: 416 392 1478

As part of their evaluation of new initiatives to help organizations address environmental issues, the US Environmental Protection Agency sponsored an EMS pilot program to test the applicability and benefit of an EMS on environmental performance, compliance, pollution prevention and stakeholder involvement in local government operations. The pilot program ran from August 1997 through to July 1999 and included nine local governments in the United States with employment ranging from 15 to 1700. The initiative was led by Global Environmental Technology Foundation (GETF). The results of the pilot program are documented in GETF (2000). The address for GETF is:

GETF
7010 Little River Turnpike, Suite 300
Annandale, Virginia, 22003
US

10.4 Environmental Guidance Documents

The following is a list of Environmental Management Guidance Documents that may be helpful.

10.4.1 CSA Publications

CAN/CSA-Z731-95, *Emergency Planning for Industry, Major Industrial Emergencies, A National Standard of Canada*

PLUS 1113, *First Steps to Environmentally Responsible Management: A Comprehensive Workbook for Environmental Policy Development*

PLUS 1117, *Competing Leaner, Keener and Greener: A Small Business Guide to ISO 14000*

PLUS 1118, *Competing Leaner, Keener and Greener: A Small Business Guide to ISO 14000 - Instructor's Guide.*

PLUS 1131, *Reporting on Environmental Performance.*

PLUS 1137, *Audit Checklist for Environmental Management Systems.*

PLUS 1138, *Integrated Checklist for Quality Management Systems and Environmental Management Systems*

PLUS 14000, *The ISO 14000 Essentials: A Practical Guide to Implementing the ISO 14000 Standards*

CAN/CSA-ISO 14001-96, *Environmental Management Systems - Specifications with Guidance for Use.*

CAN/CSA- ISO 14001-96, *Environmental Management Systems - General Guidelines on Principals, Systems, and Supporting Techniques*

10.5 References

CAN/CSA, PLUS 14000, *The ISO 14000 Essentials: A Practical Guide to Implementing the ISO 14000 Standards*

CAN/CSA- ISO 14001-96, *Environmental Management Systems - Specifications with Guidance for Use*

CAN/CSA- ISO 14001-96, *Environmental Management Systems - General Guidelines on Principals, Systems, and Supporting Techniques*

GETF, *The US EPA Environmental Management System Pilot Program for Local Government Entities. January, 2000*

MOE, *Municipal 3Rs in Ontario: 1998, Fact Sheet. October, 1999.*

USEPA, *Environmental Management Systems: An Implementation Guide for Small and Medium-Sized Organizations. November, 1996.*

Appendix A: Case Studies

CASE STUDY 1: THE REGIONAL MUNICIPALITY OF WATERLOO

The Regional Municipality of Waterloo ("the Region") consists of seven area municipalities - the Cities of Cambridge, Kitchener and Waterloo, and the Townships of North Dumfries, Wellesley, Wilmot and Woolwich. The population is approximately 420,000. The Region is responsible for garbage disposal, the entire recycling program and various other waste reduction programs. Beginning January 1, 2000, the Region assumed the responsibility of garbage collection from the area municipalities.

Scope of ISO 14001 Registration:

The Region's Waste Management Centre (WMC) located at 925 Erb Street West, Waterloo, Ontario received ISO 14001 registration on June 24, 1998. All of the operations and programs listed below are conducted at/from this address and are within the scope of the registration. Other regional waste management sites including the Cambridge landfill and transfer station and the four rural transfer stations are not within the scope of registration.

Sanitary Landfill

In 1998, approximately 106,000 tonnes of municipal solid waste was landfilled at the WMC. The remaining life of the landfill is estimated to be approximately 20 years.

Composting Program

- backyard (distribution of information, free composters)
- centralized (composting of yard waste, Christmas trees) - windrows - 10,000 tonnes per year composted
- free compost and woodchips are given out to residents twice per year
- land-applied 1,876 tonnes of leaves to neighbouring farmers' fields in 1998
- composting workshops, seasonal promotion of chipping of Christmas trees and composting of pumpkins

Recycling Programs

Includes curbside blue box programs for all seven area municipalities (townships have twice per month collection), and rollout cart collection for multi-residential buildings (having 6+ units) in the Tri-City area. There is also limited cart collection at businesses in the City of Waterloo and Township of Woolwich, and to eligible schools (public and separate). Eligible businesses may set out a maximum of three blue boxes and one 30x30x8" bundle of cardboard per week. All collection operations are contracted out to private contractors other than the multi-residential program for Cambridge and Kitchener (done by Regional staff and equipment). In 1998, approximately 28,000 tonnes of recyclables were collected.

Materials Recycling Centre

The MRC processes all recyclables collected within the seven municipalities. The MRC building and equipment is owned by the Region and the operations are contracted out.

Small Vehicle Transfer Station (SVTS)

Residents and small commercial operators may drop off garbage, recyclables, etc. The SVTS is operated and maintained by Regional staff.

Main Scale

Large commercial and residential loads of garbage generated within the Region of Waterloo go over the main scale. Records are kept for all loads. It is operated and maintained by Regional staff.

Household Hazardous Waste (HHW)

The Region runs HHW days at the WMC about six times per year (i.e., residents bring their paints, oils, acids, batteries, lawn and garden chemicals, antifreeze, etc to the WMC for proper management). Last year, about 261,000 litres of HHW was collected. Regional staff collect/inspect the waste and it is packed/disposed of by a contractor. Also, a "re-paint" program is also run (i.e., residents drop off cans half full of paint or stain and then, after inspection, the cans are set out for reuse). A used motor oil program began in 1999. Used motor oil and old filters are collected at the Waterloo transfer station for proper disposal.

Textile Recycling Program

Residents may drop off used clothing, drapery, bedding, and footwear in the bin located at the SVTS. This program is operated in partnership with Goodwill Industries.

Tire/Metal/Wood area

The tire/metal/wood area is located adjacent to SVTS. Residents and small commercial operators may drop off source separated loads of metal, tires, wood here. An outside contractor extracts the CFCs. The program diverts about 3,000 tonnes of MSW per year. The Region operates the program.

Workplace Waste Reduction Program

This program provides 3R's support and information to the Industrial/Commercial/Institutional Sector.

General Promotion

Once or twice a year, "Environews" is distributed to households in the Region. This newsletter provides residents with information on the 3R's for waste and water. Regional staff members conduct tours of the WMC, and make presentations at schools and community groups on a regular basis.

ISO 14001 Certification - Brief Chronology

The Region of Waterloo embarked on the ISO 14000 implementation process for its WMC in 1996. Upper management believed that achieving ISO 14001 registration would help to enhance existing systems. Having an Environmental Management System would facilitate commitment to the environmental policy, communication to stakeholders, identification and management of actual and potential environmental impacts, control and maintain documents, improve environmental performance based on annual objectives and targets, and assist to build a case of environmental due diligence. The ISO 14001 standard would be flexible and could be integrated into existing infrastructure.

In 1996 one full-time (in-house) staff member of the Engineering Department's Waste Management Division was assigned the responsibility of coordinating the Region's (preliminary) EMS/ISO efforts. In December, the Region commissioned an external consultant to undertake a Gap Analysis to assess their current status against the requirements of ISO 14001.

In 1997, the Region appointed three staff members to participate in a Group ISO 14000 Program offered by the Alliance of Manufacturers and Exporters of Canada. The program utilized a peer/mentoring group format to provide education about implementing an EMS and achieving ISO 14001 registration. An external consultant facilitated the program. Three staff members from the Region completed 12 working sessions over a period of a year.

During this time the Region announced their intention to achieve ISO 14001 registration for its WMC to various external stakeholders (i.e. the Waterloo Landfill Liaison Committee - neighbours of the landfill). The majority of stakeholders perceived the implementation of an environmental management system as a positive initiative and the Region kept them abreast of progress throughout the year. In September, a report went to Engineering Committee seeking approval for costs for third party registration and 3 years of annual surveillance audits. Staff perceived the following benefits of third party auditing: provides independent assessment and verification; provides objective evidence to stakeholders, provides consistent checklist to detect and remedy EMS weaknesses; motivates maintenance of the system; and demonstrates a commitment to continual improvement and prevention of pollution. Committee asked about the potential financial impacts to the capital budget. Since there were none, Committee approved the report and congratulated staff on seeking registration and on doing the majority of work in-house. One week later, the report went to Council and was approved without question.

In 1998, two pre-assessments were carried out: one in April by members of the Group Program, and another in May by KPMG Quality Registrars Inc. (who was awarded the registration and auditing services proposal). Training courses for staff were ongoing throughout this time as well - ones for management providing details on the EMS and on how to identify and manage impacts of their operations, and general awareness courses for all staff. In June, KPMG performed the registration audit and registered the WMC.

Currently, the Region utilizes one full-time (in-house) staff member (Coordinator, Programs-ISO) to implement and maintain the requirements of ISO 14001 Registration. (Note: This Coordinator has successfully completed the Lead Auditor course.) The Environmental Management Representative (EMR), who is the Manager of Engineering and Programs, is responsible for overseeing the EMS to ensure its effectiveness. Twice a year the Management Review Committee which includes the Director of Waste Management, the Manager of Operations (Landfill, HHW and the Materials Recycling Centre), the EMR, and the Coordinator, Programs meet to assess the EMS and set annual objectives and targets. Employees are updated on ISO 14001 achievements and/or requirements via regular ISO e-mail news, a periodic divisional newsletter, and an annual "refresher" course.

The Region utilizes an environmental management software program to assist them with tracking environmental impacts and aspects, training, objectives and targets, corrective and preventive action and audit results, plus manages all documents, and trigger work orders for various monitoring and measurement activities and other work.

Reported Benefits and Drawbacks of Registration

The benefits of achieving ISO 14001 certification include ensuring compliance with legislation, improved environmental record keeping and corporate memory, formalized monitoring and measurement activities, establishment and maintenance of policies and procedures, heightened staff awareness of operational and emergency procedures, and a demonstrated commitment to improving environmental performance. Benefits of the WMC's EMS have gone beyond the fence-line; because of the WMC's commitment to legal compliance, by recognizing noncompliance for fuel storage, all tanks in the Region have been targeted and compliance will be ensured. As well, the WMC's EMS may be used as a blueprint to facilitate registration of other interested Regional departments or divisions.

A drawback of ISO 14001 certification is the effort required to maintain the paper trail, which in the case of the Region is extensive. As well, training requirements are extensive; new contractors and staff, refresher courses, etc., while necessary, take time. Some, no matter how much training they receive, may never embrace ISO 14001 and comply with documented procedures.

If the Region were to implement another EMS, the Region would look at doing the following things differently:

Commence staff training early, especially for internal auditors. At the time of registration, only the EMR and the Coordinator, Programs were trained internal auditors. Given their extensive involvement in the day-to-day activities of the EMS, external auditors were concerned about objectivity. The Region has since trained 12 internal auditors.

Consider including supervisory staff early in the decision making process. The decision to seek registration as well as preliminary work for implementation was primarily done by two individuals. There may be a benefit in including others, especially supervisory staff whose programs would be affected by the EMS, to provide opportunity for discussion, and implementation options. (Note that this may slow down the implementation process.)

Streamline documentation. Some elements of the standard have to be documented - others do not. The Region decided to document as much as possible and has created numerous files to accommodate the paperwork. Currently, the Region is looking at ways of streamlining the documentation to reduce the work involved in maintaining the EMS.

Overall Budget

It was estimated that the Region has spent approximately $50,000 implementing the EMS to date (this includes certification). A breakdown of the expenses is provided below:

- $4,500 for the Gap Analysis;
- $10,000 (plus expenses) to participate in the ISO 14000 Group Program (which assisted in instructing in-house staff of ISO 14001 requirements);
- $20,000 for ISO 14001 Registration (includes audits by the registrar for a period of 3 years);
- $2,000 for Lead Auditor Course; and
- $4,500 to purchase the EMS software.

No new full time permanent staff was hired to implement the EMS over the 18-month period.

It is expected that existing staff will maintain the EMS. The EMS Coordinator will not be dedicated full-time - approximately half of her time would be involved in conducting audits, training, promotion and education, corrective and preventive actions, and other maintenance activities. Approximately half of a clerk's time would be involved in maintenance for filing, and updating the database.

CASE STUDY 2: THE MUNICIPAL GOVERNMENT OF HAMILTON WENTWORTH

The Municipal Government of Hamilton Wentworth ("the Region") consists of the Cities of Hamilton and Stoney Creek, the Towns of Ancaster, Dundas and Flamborough, and the Township of Glanbrook.

Description of the Region's Services

The Region's Environmental Department ("the Department") is responsible for the delivery of the following services:

- collection and treatment of storm water in the City of Hamilton;
- collection and treatment of wastewater;
- management of strategic regional planning issues;
- provision of a potable water supply; and
- management of the community's solid waste.

The Region's original objective was to achieve ISO 14001 certification for each of these service areas by December 1998. However, in September 1998, a decision was made by the Region and the City of Hamilton to amalgamate. The December 1998 ISO 14001 registration target date has proved to be ambitious due in part to the restructuring changes associated with the amalgamation of the Region and the City of Hamilton. It is anticipated however, that the Waste Management Division of the Region will be in a position to seek certification to the ISO 14001 Standard by the fall of 2000.

The Waste Management Division of the Region owns the following waste management facilities:

1. Energy from waste facility / incinerator (SWARU) located in the City of Hamilton;
2. Three transfer stations (two are located in the City of Hamilton and the other is located in Dundas);
3. One active landfill site (located in the Township of Glenbrook);
4. Ten inactive (closed) landfill sites (located throughout the Region);
5. Leaf and yard waste composting program;

6. A household hazardous waste program;

7. A blue box recycling program;

8. A white goods collection program;

9. A home composting program;

10. Administration of the solid waste and sewer use by-laws;

11. Laboratory services to the Region; and

12. Environmental education.

External contractors have been retained to operate the services one to nine above. The environmental monitoring of the active and closed landfills is the responsibility of the Region. It should be noted that at the present time area municipalities are responsible for curbside collection of garbage. This however may change following the amalgamation of the City of Hamilton and the Region.

In 1998, the Region collected approximately 240,000 tonnes of blue box materials, leaf and yard waste, solid waste and white goods. Approximately 50,000 tonnes of solid waste materials were landfilled, 10,000 tonnes of leaf and yard waste was composted, and 140,000 tonnes of waste materials were sent the energy from waste facility at SWARU. The EFW generated electricity, for the hot water line, of 1,500 homes in the City of Hamilton.

Background

In keeping with the community developed and endorsed plan for the year 2020 entitled "Vision 2020: The Sustainable Region" (which describes the Region's intent to integrate sustainable development into all decision making), the Regional Council developed a Corporate Environmental Policy in 1995. The Region's EMS is being developed within the context of both community and corporate goals and directions of sustainable development. Due to the fact that VISION 2020 was already in place, it is reported that the Regional Council approval was easily obtained for budget requests (discussed below).

ISO 14001 Registration Implementation Process

In-house personnel are primarily responsible for the implementation of the Region's EMS. A Senior Policy Analyst from the Region's Planning and Development Services Department is

responsible for coordinating and facilitating the EMS project. An external consultant has been retained to mentor in-house staff throughout the EMS implementation process, as well as provide training when required.

The implementation of the Region's EMS consists of the following phases:

Phase One

Throughout 1997, the Region's Environment Commissioner personally introduced the concept of the EMS to all levels staff, including unionized staff. All personnel were given opportunities to contribute ideas on the content of the EMS Mission Statement. Approximately 10% of in-house personnel provided suggestions that were considered in the development of the Statement.

An initial Gap Analysis was also completed in the Spring/Summer of 1997. The external consultant provided training to eight in-house personnel on ISO 14001 requirements, as well as overall interview techniques. Twenty-two Section Managers (Superintendents, Manager & Supervisors) were interviewed. The Gap Analysis concluded that approximately 65% of ISO 14001 requirements were in place.

Following the initial Gap Analysis, existing management processes were restructured in terms of five core businesses of the Environmental Department:

- Water treatment and distribution services;
- Wastewater collection and treatment services;
- Solid waste disposal and management services;
- Regional planning and development services; and
- Collection of storm water in the City of Hamilton.

In the fall of 1997, five working groups, consisting of in-house personnel (involving a total of 30 staff), were organized and assigned to each one of these core business groups. Directors were assigned to lead each of the core business groups. In order to enhance the objectivity of group members, Directors were assigned to business groups outside their areas of direct responsibility.

The Environmental Mission Statement was completed in January 1998. The statement incorporated not only the Region's commitment to VISION 2020, and the Corporate Environmental Policy, but also integrated the notion of continual improvement as required by

ISO 14001. The Statement was signed by each member of the Region's Senior Management, and also communicated to all personnel via an employee newsletter.

Within this time period two in-house staff members (including the EMS Project Coordinator) completed a five day Lead Auditor Course provided by the Alliance of Manufacturers and Exporters of Canada.

Phase Two

In Phase Two, a draft Corporate EMS Manual was developed by the EMS Project Coordinator, and reviewed by Senior Management, in early 1998. The EMS Manual was developed to provide guidance to Implementation Groups (discussed below) on what is required to meet the ISO 14001 Standard.

In February 1998, the business working groups profiled how the five core businesses were being delivered to the community, the effect operations were having on the natural environment (identification of environmental impacts), and the regulatory requirements for each.

During this time, a set of measurable objectives and targets were also developed by Senior Management in order to:

- link operations and activities to the goals of Vision 2020;
- measure and report on achievements;
- externally communicate on how the Department intends to address its environmental concerns; and
- develop an annual work plan and capital works program to incorporate these environmental concerns.

Phase Three

In June 1998, Implementation Groups were organized for each core business area to develop an appropriate management system for their group. The following tasks are in the process of being completed by each of the Implementation Groups:

- review and confirm how services are delivered, the associated environmental impacts, and the legal (and other) requirements guiding their service;

- identify the mechanisms implemented for controlling impacts and maintaining regulatory compliance (e.g. technological changes, personnel training, and capital improvements);
- structure the existing systems to ensure that the evidence exists to prove that environmental impacts of their operations are in fact being controlled (meet requirements of Corporate EMS manual); and
- develop an environmental management plan to address objects and targets established by Senior Management.

Phase Four

To date, only the Waste Management business area has progressed to this phase, which involves establishing the systems for completing the cycle of continual improvement. The Waste Management business area is currently in the process of completing the following tasks:

- presenting Regional Council with an action plan, as part of the annual budget process, for achieving the approved objective and targets;
- providing training and awareness about EMS requirements for all personnel;
- establishing an integral management system audit process; and
- implementing an annual management review to assess the overall effectiveness of the EMS in achieving defined objectives and targets.

It is estimated that the Waste Management Division of the Region will be in a position to seek registration to the ISO 14001 standard in the fall of 2000. Registration will include the management of the overall Division, including the services noted above (as well as management of external contractor services).

Regional Council approved a total budget of $176,000 (in December 1996 a budget of $126,000 was approved, and then in mid-1997 Council approved a second budget of $50,000). A breakdown of the budget includes:

- $80,000 delegated for external consultant;
- $50,000 salary delegated to a Full time Project Assistant (16 month contract);
- $20,000 for ISO 14001 Registration (included audits by the registrar for a period of 3 years);
- $10,000 delegated to hire two contract personnel for a 6-month contract; and
- $10,000 for miscellaneous communication and marketing materials.

Advantages and Barriers

As a custodian of public environmental facilities there is typically a need for the Region to demonstrate to the community that operations are being carried out in an environmentally responsible manner. Achieving ISO 14001 registration will assist the Region to publicly demonstrate that they are efficiently operating, in a sustainable and ethical manner.

The initial EMS and ISO 14001 registration discussions / presentations made by the Environment Commissioner in 1997 sparked a mixture of emotions among in-house personnel. Staff either did not trust the proposed EMS modifications or they perceived the management system as a life line to demonstrate that they were in fact doing their job correctly. Also, staff acknowledged that if ISO 14001 registration was achieved, any future (potential) issues of environmental liability would then become the onus of the Region, and not an individual personal liability.

As previously noted, a decision was made by the Region and the City of Hamilton to amalgamate. It was originally anticipated that the amalgamation process would be a six month process. The process has however taken longer than expected. It was reported that the amalgamation process has been the largest barrier to meeting the Region's original registration date of December 1998. With the exception of the solid waste department, the remaining business groups are not expected to achieve registration until after the amalgamation process is complete.

Appendix B: Sample Policies, Procedures and Schedules

TABLE B.1
Municipal Waste Management System
Sample Environmental Policy

Purpose: This Environmental Policy has been developed for (state the Municipality)'s Municipal Waste Management System employees and contractors to help them perform their jobs in an environmentally sound manner. It also provides the basis for the (state the Municipality) Municipal Waste Management System's Environmental Management System.

Scope: This Policy applies to all of the employees and contractors, as well as sector operations, activities and processes.

Policy: As a responsible corporate citizen, the (state Municipality)'s Municipal Waste Management System is committed to practicing sustainable development, balancing the pursuit of economic growth with the protection of the environment.

The (*state municipality*)'s Waste Management Division will strive to ensure that all operations and processes are, at a minimum, in full compliance with all applicable legislation, as well as with our standards, customer and other requirements.

We believe that preventing pollution and optimizing the utilization of resources, including chemicals, water and energy, are essential principles in all facility operations. Thus, in our planning and operational decisions, these environmental guidelines will be considered wherever practicable.

We will periodically evaluate our activities and measure our environmental performance against established goals. We will actively pursue pollution prevention programs, where appropriate, to eliminate wastes and emissions at their source(s). We will also review the effectiveness of our environmental management system on a regular basis with a view to continual improvement.

We will advocate the adoption of prudent environmental principles and practices to our vendors, suppliers and contractors.

We will communicate with employees, suppliers, neighbours, key contractors, Councilors, and regulatory agencies as well as with the general public regarding our environmental activities.

It is the responsibility of all employees to understand and contribute towards the goals of this policy. Managers have a special obligation to keep informed about environmental issues, so that they may maintain sound facilities.

We will incorporate environmental considerations into all waste management decisions including expansion and decommissioning activities.

Signed / Dated by Top Management

TABLE B.2
SAMPLE PROCEDURE FOR IDENTIFYING AND EVALUATING ENVIRONMENTAL ASPECTS

ISO 14001 Procedure – Element 4.3.1 – Environmental Aspects
Issue Date - February 15, 2000
Revision No. 1

1. Purpose	To identify the elements of the (state Municipality)'s Municipal Waste Management operations and activities that can interact with the environment, and to assess these elements for the significance of their potential environmental impact(s). To ensure that the environmental aspects are identified in order to determine which aspects may have a significant impact on the environment.
2. Scope	This procedure is for the activities that occur at this facility and those that the facility has control over. A baseline evaluation will be conducted of existing activities. This evaluation will require updating based on future changes to activities and ongoing continual improvement. Applicable to: • All operations within the municipality including waste collection and sorting systems, recycling programs, organic diversion programs and waste disposal operations. • Activities and services of the municipality's contractors and suppliers. This procedure should also be followed when new facilities or production processes are planned.
3. Responsibility	The EMS Project Coordinator is responsible for the final review of the environmental aspects.
4. Procedure	1. The EMS Project Coordinator is responsible for assembling a cross-functional team to perform the evaluation. The Team may include representatives from all departments/operational units of the municipal waste management system. 2. The Team is responsible for conducting a review and analysis of operations to identify the environmental aspects and impacts. This includes an analysis of the following: • environmental aspects under normal operations, shut down/start up, and/or emergencies (where applicable); • past environmental audit reports (if available) to identify elements of activities that have been problematic; • licenses, permits and regulations to identify elements of the municipality's activities that are subject to legal requirements; • past incident reports; • process flow diagrams identifying points of waste discharge to land, water or air to identify the potential for pollutants to be released directly to the environment (e.g. leachate, landfill gas and fugitive emissions from landfills);

TABLE B.2 (CONT'D)
SAMPLE PROCEDURE FOR IDENTIFYING ENVIRONMENTAL ASPECTS

4.Procedure (cont'd)	• other unit processes, including maintenance, warehousing and site management activities, to identify the potential for any materials to be released to the environment or to secondary containment structures; • potential for wastes being transported to and from waste management facilities (landfills, etc.) to be released to the environment; and • potential for products purchased by the municipality to interact with the environment. 3. The Team is responsible for developing criteria for evaluating the significance of environmental aspects. Environmental impacts resulting from each environmental aspect should be identified. 4. The Team reviews the environmental aspects identified and assesses their significance based on the evaluation criteria selected. For example, assess each aspect on a scale of 0 to 10 for the following items: severity of impact to the environment; likelihood of occurrence; and level of business concerns. Apply a weight to each item as follows: Severity of Impact 4 Likelihood of occurrence 2 Business Concerns 4 5. The EMS Project Coordinator documents the Team's analysis and evaluation. 6. Whenever changes to activities are undertaken, the EMS Project Coordinator updates the environmental aspects calling upon the Team as he/she deems appropriate.
5. Related Records	Schedule - : Significance Evaluation Criteria Schedule - : Summary of Environmental Aspects and Significance
6. Approval	

_____	_____	_____	_____
Management Representative	Date	Director, Waste Management	Date

Next Revision: February 15, 2001 Author: John Smith, EMS Project Coordinator
Revision Schedule: Annual Reviewed by: Jane Doe, Manager, Operations
Document Locations: Engineering

TABLE B.3
SAMPLE SCHEDULE FOR DOCUMENTING ENVIRONMENTAL ASPECTS, IMPACTS AND THEIR SIGNIFICANCE

ACTIVITY	ASPECTS	IMPACTS	SIGNIFICANCE RATING
Waste Collection (Normal Operations)	Community Services Generation of Air Emissions Generation of Noise Fuel Use	Hygiene / Disease Control Air Pollution Noise Pollution - Discomfort of Humans Potential for Spills to Contaminate Air, Water and Ground	
Landfilling - Waste Receipt Truck Traffic	Noise Fugitive Dust	Noise Pollution Air Pollution	
Landfilling - Operations	Fugitive Dust Odour Noise Litter Aesthetics Land Use	Air Pollution Air Pollution Noise Pollution Land Pollution Visual Impact Resource Depletion	
Landfilling - Biodegradation of Waste	Leachate Gas	Water Pollution Air Pollution	
Landfilling - Leachate Collection and Treatment	Effluent Sludge	Water Pollution Land Pollution	
Landfill Gas Collection and Utilization	Recovered Energy Air Emissions	Resource Conservation Air Pollution	
EFW - Waste Receipt Truck Traffic	Noise Dust	Noise Pollution Air Pollution	
EFW – Waste Storage / Processing	Odour Noise Dust	Air Pollution Noise Pollution Air Pollution	
EFW – Waste Combustion	Odour Noise Ash Emissions Land Use	Air Pollution Noise Pollution Land Pollution Air Pollution Resource Depletion	

TABLE B.3
SAMPLE SCHEDULE FOR DOCUMENTING ENVIRONMENTAL ASPECTS, IMPACTS AND THEIR SIGNIFICANCE

ACTIVITY	ASPECTS	IMPACTS	SIGNIFICANCE RATING
EFW - Gas cleaning (air pollution control device)	Cleaned Emissions	Air pollution	
Compost Facility Waste Receipt – truck traffic	Noise Dust	Noise Pollution Air Pollution	
Compost Facility Waste storage / processing	Odour Noise Dust	Air Pollution Noise Pollution Air Pollution	
Compost Facility Biological Treatment	Compost Odour Noise Residue Emissions Land Use	Resource Conservation Air Pollution Noise Pollution Land Pollution Air Pollution Resource Depletion	
MRF - Waste Receipt - truck traffic	Noise Dust	Noise Pollution Air Pollution	
MRF - Waste Sorting & Processing	Recovered Materials Noise Dust Odour	Resource Conservation Noise Pollution Air Pollution Air Pollution	

TABLE B.4
SAMPLE PROCEDURE FOR LEGAL AND OTHER REQUIREMENTS

ISO 14001 Procedure – Element 4.3.2. – Legal and Other Requirements
Issue Date - February 15, 2001
Revision No. 1

1. Purpose	To ensure that legal and other requirements that are applicable to the environmental aspects of our activities are met.
2. Scope	This procedure is for the activities that occur at this facility.
3. General	A number of regulatory bodies and other non-regulatory agencies have legislation/regulations/guidelines related to environmental issues to which our activities are required to comply. Potential areas that are subject to legal requirements at this facility are: • landfilling operations; • leachate collection and treatment; • landfill gas collection and utilization; • potential generation of air, noise, dust and odour emission management and assessments; • hazardous waste management; • EFW waste storage / processing; • EFW gas cleaning; • biological treatment; • MRF waste sorting / processing; • recycling collection and sorting; • composting and shredding; and • fuel management / storage tank management.
4. Responsibility	The EMS Project Coordinator is responsible for ensuring that the legislation and other requirements are kept up to date and that employees are aware of the legal and other requirements effecting their area of operations.
5. Procedure	Normal Operations 1. The EMS Project Coordinator is responsible for obtaining copies of all relevant environmental legislation and other requirements relating to the activities at the facility. 2. The EMS Project Coordinator is responsible for reviewing the legal and other requirements on an annual basis to identify any new requirements. 3. The EMS Project Coordinator is responsible for communicating relevant legal and other requirements to the Department Managers that are not included as part of the regular training program. 4. Department Managers are responsible for communicating legal and other requirements to employees in the relevant areas of functions.

TABLE B.4 (CONT'D)
SAMPLE PROCEDURE FOR LEGAL AND OTHER REQUIREMENTS

5. Procedure (Cont'd)	Identification of Non-Compliance with Legal Requirements 1. The EMS Project Coordinator is responsible for reviewing compliance with legal and other requirements on a quarterly basis (since most legal subscriptions are issued quarterly) 2. The EMS Project Coordinator is responsible for informing, in writing, the Head of the Waste Management Department and applicable Department Manager(s) of all deviations/potential deviation from the requirements. 3. The EMS Project Coordinator is responsible for creating an action plan to address any non-compliance issues.
6. Related Records	Schedule 4.3.2a - Summary of Legal and Other Requirements
7. Approval	

Management Representative	Date	Director, Waste Management	Date

Next Revision: February 15, 2001	Author: John Smith, Environmental Coordinator
Revision Schedule: Annual	Reviewed by: Jane Doe, Manager, Operations
Document Locations: Engineering	

TABLE B.5
SAMPLE CONTRACTOR ENVIRONMENTAL RESPONSIBILITY POLICY

ISO 14001 Procedure - Element 4.4.2 - Training, Awareness, Competence
Issue Date - February 15, 2000
Revision No. 1

1. Purpose	The purpose of this policy is to ensure that all contractors abide by the (specify the location of the Region)'s environmental policies and procedures.
2. Scope	This policy applies to any person or organization hired to perform contract work for any facility or service managed by the Region. This policy provides the framework to establish procedures to make contractors aware of their environmental responsibilities, to monitor their activities, and to take disciplinary action if require.
3. Responsibility	The EMS Project Coordinator is responsible for ensuring that in-house staff and contractors apply this policy.
4. Policy	The Region of (specify location) is committed to minimizing the risk of environmental damage for all operations and activities, including the activities of contractors and their employees. The Region requires that all companies and individuals hired to perform contract work at all facilities conform to all of the Region's environmental policies and procedures.
5. Procedure	To implement this policy the Region will: Select only those contractors who are capable of performing their activities in an environmentally appropriate manner. Include conformance with the Region's environmental policy and procedures as a clause in the contract. Ensure that contractors are aware of their environmental responsibilities by making them aware of applicable environmental policies and procedures. Make contractors aware of the environmental risks of their activities, and of the risks associated with the Region's waste management operations, before contractors commence work. Ensure that contractors are aware of reporting procedures in the event of an environmental incident. Provide guidance and assistance to contractors to ensure environmentally safe work practices, and appropriate waste management practices; and Periodically monitor contractor activities and conformances with the Region's policies and procedures and take corrective action for nonconformance.

TABLE B.6
SAMPLE PROCEDURE FOR TRAINING, AWARENESS AND COMPETENCE

ISO 14001 Procedure - Element 4.4.2 - Training, Awareness, Competence
Issue Date - February 15, 2001
Revision No. 1

1. Purpose	To ensure that environmental training needs are identified and appropriate training is provided.
2. Scope	This procedure is for training employees on various issues relating to the environment including general awareness, waste management, resource conservation, emergency response, and environmental management.
3. General	Training is required by regulations that have specific training requirements. Training will also improve general environmental performance and reduce environmental risk. The main topics for training include: • environmental management • emergency response • waste management • transportation of dangerous goods • chemical management • spill response procedures • environmental awareness
4. Responsibility	The EMS Project Coordinator and the Human Resources Managers are responsible for implementing the training system.
5. Procedure	**Identification of Training Needs** The EMS Coordinator is responsible for identification of all training required under legislation and under the ISO 14001 Standard and notifying the Department Managers (including Purchasing) of the specific training requirements for their areas. The (e.g. Purchasing Manager) is responsible for ensuring that contractors have received the required training. The Facility Managers are responsible for identifying the personnel in their department who require training.

TABLE B.6 (CONT'D)
SAMPLE PROCEDURE FOR TRAINING, AWARENESS AND COMPETENCE

5. Procedure	**Delivery of Training** The EMS Project Coordinator is responsible for identifying to the Human Resources Manager the employees requiring training and the training required. The Human Resources Manager is responsible for arranging and providing the training to the employees. The training may take several forms as deemed appropriate including the use of outside training firms, training videos, and training by other employees. The training must include testing to ensure that the employees can demonstrate their competence. **Training New Employees** The Facility Manager is responsible for identifying to the Human Resources Manager any training requirements for new employees. The Human Resources Manager is responsible to ensure that training is provided to all new employees in a timely fashion. **Evaluating Retraining or Re-Certification Needs** The Human Resources Manager is responsible for keeping records of the training conducted and ensuring that retraining or re-certification is provided, as required. The EMS Project Coordinator is responsible for reviewing the training requirements on an annual basis.
6.Related Records	Schedule - : Environmental Training Requirements Schedule - : Tracking of Training Delivery
7. Approval	
Management Representative Date	Director, Waste Management Date
Next Revision: February 15, 2001 Revision Schedule: Annual Document Locations: Engineering	Author: John Smith, Environmental Coordinator Reviewed by: Jane Doe, Manager, Operations

TABLE B.7
SAMPLE SCHEDULE FOR LEGISLATED ENVIRONMENTAL TRAINING REQUIREMENTS

Schedule 4.4.2a - Legislated Environmental Training Requirements

TRAINING SUBJECT	LEGISLATIVE REQUIREMENT
WHMIS/MSDS	O. Reg. 834 and 860 under OHSA
Transportation of Dangerous Goods	Part IX of TDGR under TDGA
Confined Space Entry	Section 67 of O. Reg. 851 under OHSA
Personal Protective Equipment	Section 79 of O. Reg. 851 under OSHA
Protection Against Hazardous Substances	Section 130 of O. Reg. 851 under OHSA
Fuel Transfer	Section 43 of GHC and O. Reg. 521 under GHA
Asbestos	O. Reg. 837 and 838 under OHSA
CFC certification	O. Reg. 189/94 Environment Canada and the Heating, Refrigeration and Air Conditioning Institute (requires the Ozone Depletion Prevention Card)

TABLE B.8
SAMPLE SCHEDULE FOR ISO 14001 ENVIRONMENTAL TRAINING REQUIREMENTS

Schedule 4.4.2b - ISO 14001 Environmental Training Requirements

TRAINING SUBJECT	PERSONNEL REQUIRING TRAINING
Environmental Awareness and Environmental Policy	All Employees
Work Activities, Impacts, and Minimizing Environmental Impact through Work Practices	Facility Employees
ISO 14001 Environmental Management	EMS Project Coordinator, Environmental Co-ordinator, Environmental Committee members
Spill response and control	EMS Project Coordinator, Environmental Co-ordinator, Emergency Response Team
Auditor Training	Employees selected to conduct in-house audits (e.g. compliance audits, documentation reviews, internal audits, EMS audit)
Emergency preparedness and response	EMS Project Coordinator, Environmental Co-ordinator, Emergency Response Team
Emergency preparedness and response awareness	All Employees

TABLE B.9
ADDITIONAL ENVIRONMENTAL TRAINING

TRAINING SUBJECT	PERSONNEL REQUIRING TRAINING
Subject waste storage, handling and control	Employees that Handle Waste
Solids/recyclable storage, handling and control	Material Handling Employees
Chemical/hazardous material storage, handling and disposal	Shipping/Receiving Employees
Personal Protective Equipment	All Employees
Energy Conservation	Maintenance Supervisor and Maintenance Staff
Stormwater Management	Material Handling Staff

TABLE B.10

SAMPLE TRAINING ACKNOWLEDGMENT FORM

Acknowledgment of receipt of training for Procedure No.: _____

Procedure Revision No.: _____

Training Provided By: _____

Date of Training: _____

Duration: _____ hours/days

PLEASE SIGN AND DATE BELOW TO ACKNOWLEDGE YOUR UNDERSTANDING OF THE ABOVE, AND YOUR AGREEMENT TO ADHERE TO THE STEPS OUTLINED.

(to be signed off by all staff who have completed the training/refresher session)

Name of Person Trained Position Date

PLEASE FORWARD COMPLETED TRAINING ACKNOWLEDGMENT FORM TO THE EMS COORDINATOR

TABLE B.11
SAMPLE PROCEDURE FOR INTERNAL COMMUNICATION

ISO 14001 Procedure – Element 4.4.3 - Internal Communication
Issue Date - February 15, 2001
Revision No. 1

1. Purpose	To ensure effective and timely communication of environmentally-related information within the municipality.
2. Scope	This procedure is for internal communications on the various elements of our ISO 14001 environmental management system, including the environmental policy, objectives and targets, procedures, hazards and emergency situations.
3. General	A number of methods are used for communication internally on environmental manners. The main topics for internal communication include: • environmental policy, objective and targets • significant environmental impacts • environmental management roles and responsibilities • performance relative to environmental objectives, targets and EPIs • environmental procedures • hazards and emergency situations
4. Responsibility	The EMS Project Coordinator is responsible for ensuring that there is effective communication of environmental information, and that all employees are familiar with the EMS policies and procedures.
5. Procedure	Normal Operations 1. The EMS Project Coordinator is responsible for communicating the organization's environmental policies and procedures to all employees. The EMS Project Coordinator is also responsible for communicating roles and responsibilities for environmental management. 2. The EMS Project Coordinator is responsible for communicating environmental targets and performance to the Department Managers. 3. Department Managers are responsible for communicating environmental targets and performance to employees in their areas of functions, as well as to the management team. 4. Department Managers are responsible for communicating environmental procedures (and any revisions) and any other significant environmentally related information. 5. The method for internal communication is at the discretion of the responsible manager. These methods may include: • Employee meetings • Workstation procedures • Bulletin board and posters • Letters to employees • Newsletters

TABLE B.11 (CONT'D)
SAMPLE PROCEDURE FOR INTERNAL COMMUNICATION

5. Procedure	Potential Hazard Reporting 1. All employees are responsible for reporting environmental hazards (including potential for spills and fires) to the Department Manager or in their absence Shift Foreman. 2. The Department Manager (or designate) is responsible for completing the hazard reporting form and submitting it to the EMS Project Coordinator. 3. The EMS Project Coordinator maintains a log of all reported hazards and tracks the investigation and correction (as needed) for all reported hazards. 4. Departments Managers are responsible for communicating to employees the results of investigating/correcting a reported hazard. Emergency Reporting 1. All employees are responsible for reporting environmental emergencies (including spills and fires) immediately upon discovery. Such emergencies are reported directly to the Lead Hand or first level Supervisor. 2. If necessary, the Emergency Response Procedure should also be initiated. 3. The Lead Hand, or in their absence the first level Supervisor, notifies the organization's EMS Project Coordinator. 4. The Department Manager or their delegate is responsible for completing the emergency investigation form and submitting it to the EMS Project Coordinator within one working day of the emergency. 5. The EMS Project Coordinator maintains a log of all reported emergencies and tracks the investigation and correction (as needed) for all reported emergencies. 6. Communication of the results of investigating emergencies is restricted to the Plant Manager, EMS Project Coordinator and appropriate Department Manager.
6. Related Records	Schedule - : Hazard Reporting Form Schedule - : Hazard Investigation Form Schedule - : Hazard Tracking Form Schedule - : Emergency Investigation Form Schedule - : Emergency Tracking Form
7. Approval	

_____	_____	_____	_____
Management Representative	Date	Director, Waste Management	Date

Next Revision: February 15, 2001	Author: John Smith, Environmental Coordinator
Revision Schedule: Annual	Reviewed by: Jane Doe, Manager, Operations
Document Locations: Engineering	

TABLE B.12
SAMPLE SCHEDULE FOR HAZARD REPORTING

SO 14001 Procedure – Element 4.4.3a - Hazard Reporting Form
Issue Date – February 15, 2001
Revision No. 1

Date of Occurrence: _____

Date of Report: _____

Hazard Reported by: _____

Form Completed by: _____

Department(s) Effected: _____

Description of Hazard

Suggested Mitigation Measure (if any):

Distribution: **Appropriate Department Manager(s)**
EMS Project Coordinator

Signature of Person Completing: _____

TABLE B.13
SAMPLE SCHEDULE FOR HAZARD INVESTIGATION

SO 14001 Procedure – Element 4.4.3b - Hazard Investigation Form
Issue Date – February 15, 2001
Revision No. 1

Date of Occurrence: _____

Date of Report: _____

Hazard Reported by: _____

Form Completed by: _____

Department(s) Effected: _____

Brief Description of Hazard

Does the EMS Project Coordinator agree that this is a hazard? Yes/No):	
Priority Designation (Emergency, High, Medium, Low):	
Ease of Mitigation (High, Medium, Low):	

RECORD OF ACTIONS

Action Taken	Date

Potential Mitigation Measures

Description of Final Resolution

Distribution: **Appropriate Department Manager(s)**
EMS Project Coordinator

Signature of Person Completing: _____

TABLE B.14

SAMPLE SCHEDULE FOR HAZARD INVESTIGATION TRACKING

Schedule 4.4.3c – Hazard Investigation Tracking Form

Date of Occurrence	Date of Initial Report	Department(s) Effected	Hazard Description	Hazard Confirmed (Yes/No)	Priority Designation (Emergency, High, Medium, Low)	Pending Action	Resolution	Date Resolution Implemented

TABLE B.14

SAMPLE SCHEDULE FOR HAZARD INVESTIGATION TRACKING

Schedule 4.4.3c – Hazard Investigation Tracking Form

Date of Occurrence	Date of Initial Report	Department(s) Effected	Hazard Description	Hazard Confirmed (Yes/No)	Priority Designation (Emergency, High, Medium, Low)	Pending Action	Resolution	Date Resolution Implemented

TABLE B.15
SAMPLE PROCEDURE FOR DOCUMENT CONTROL

ISO 14001 Procedure – Element 4.4.5 – Document Control
Issue Date – February 15, 2001
Revision No. 1

1. Purpose	To ensure that the Waste Management Department creates and maintains EMS related documents in a manner sufficient to implement the EMS as required by ISO 14001.
2. Scope	This procedure is for control of documents on various issues relating to the EMS. It covers all EMS documentation related to the operations and programs conducted by the Waste Management Division.
3. General	Documentation is required to ensure that the organization is able to implement procedures for an environmental management system. The main documents are: • environmental management system overview • environmental policy • environmental objectives and targets • key personnel and responsibilities • environmental procedures • emergency procedures
4. Responsibility	Each Department/Facility Manager or designate is responsible for drafting, updating and obtaining appropriate approvals for documents affecting their functional area. The EMS Project Coordinator is responsible for maintaining documents in a manner consistent with the requirements of ISO 14001.
5. Procedure	**Document Development** 1. The EMS Project Coordinator is responsible for directing the development of the documents required for the environmental management system. All documents are to be in a standardized format. 2. The EMS Project Coordinator ensures that all documents developed are clearly identified, dated, and noted as to when revision/review is required. **Maintaining of Documents** 1. The EMS Project Coordinator is responsible for distributing documents to appropriate staff members, updating documents as required and destroying obsolete documents. 2. The EMS Project Coordinator, at his/her discretion, may retain copies of obsolete documents. These documents must clearly be identified as "obsolete, retain for information purposes".

TABLE B.15 (CONT'D)
SAMPLE PROCEDURE FOR DOCUMENT CONTROL

	3. The EMS Project Coordinator is responsible for: • initiating the annual review process for EMS-related documents; and • ensuring that revised documents are legible, dated (with dates of revision), readily identifiable and conform to ISO 14001.
6. Related Records	Schedule - : List of Documents, Location and Revision Schedule
7. Approval _____ _____ _____ _____ Management Representative Date Director, Waste Management Date	
Next Revision: February 15, 2001 Revision Schedule: Annual Document Locations: Engineering	Author: John Smith, Environmental Coordinator Reviewed by: Jane Doe, Manager, Operations

TABLE B.16
SAMPLE SCHEDULE FOR DOCUMENT CONTROL

Schedule 4.4.5a - List of Documents, Location and Revision Schedule

DOCUMENT/PROCEDURE	LOCATION	REVISION	REVISION SCHEDULE
Environmental Policy	1,2,3,4	Revision 1.0 - May 15, 2000	Annual
Objectives and Targets	1,2,4	Revision 1.0 - May 15, 2000	Semi-Annual
Structure and Responsibility	1,2	Revision 1.0 - May 15, 2000	Annual
Environmental Management System Documentation	1,2	Revision 1.0 - May 15, 2000	Individual Documents as per Revision Schedule
Management Review	1,2	One year after implementation of ISO 14001	Bi-Annual
Procedure: Environmental Aspects	1,2	Revision 1.0 - May 15, 2000	Annual
Procedure: Legal and Other Requirements	1,2	Revision 1.0 - May 15, 2000	Annual
Procedure: Environmental Management Program	1,2	Revision 1.0 - May 15, 2000	Annual
Procedure: Training, Awareness, and Competence	1,2	Revision 1.0 - May 15, 2000	Annual
Procedure - Internal Communication	1, 2	Revision 1.0 - May 15, 2000	Annual
Procedure - External Communication	1, 2, 5	Revision 1.0 - May 15, 2000	Annual
Procedure: Document Control	1, 2	Revision 1.0 - May 15, 2000	Annual
Procedure: Operational Control	1, 2	Revision 1.0 - May 15, 2000	Annual
Procedure: Emergency Preparedness and Response	1,2	Revision 1.0 - May 15, 2000	Annual
Procedure: Monitoring and Measurement	1,2	Revision 1.0 - May 15, 2000	Annual
Procedure : Nonconformance and Corrective and Preventive Action	1, 2	Revision 1.0 - May 15, 2000	Annual
Procedure: Records	1, 2	Revision 1.0 - May 15, 2000	Annual
Procedure: Environmental Management System Audit	1, 2	Revision 1.0 - May 15, 2000	Annual

Locations: 1 = EMS Binder in Engineering; 2 = EMS Documentation System on the computer network; 3 = Posted on the wall at Visitor's entrance; 4= Posted on Employee Notice Board; 5= EMS Binder at Switchboard/Reception

Retention: One paper copy of each revision for record purposes. Mark old version - "Obsolete, retained for information purposes".

TABLE B.17
SAMPLE EMERGENCY RESPONSE PROCEDURE

ISO 14001 Procedure - Element 4.4.7 - Emergency Preparedness and Response
Issue Date - February 15, 2000
Revision No. 1

1. Purpose	To prevent and mitigate environmental impacts associated with an accident or an emergency situation.
2. Scope	This procedure applies to all potential accident or emergency situations associated with operations and programs provided by the Waste Management Division.
3. General	It is the policy of the Waste Management Division to periodically test the effectiveness of the emergency response procedure. Where necessary, the Waste Management Division is required to review and revise emergency response procedures, particularly after the occurrence of an accident or emergency situation.
4. Responsibility	The Facility Manager or Designate is required to ensure that the emergency response plans are established, communicated, implemented, and maintained for all potential environmental accident and emergency situations. In the event of an incident, Municipal personnel are required to complete the Environmental Incident Report (sample attached). It is the responsibility of all management to ensure that environmental emergencies or incidents are recorded and processed. It is the responsibility of the Director of Waste Management to approve all accident and emergency preparedness and response plans. The EMS Project Coordinator is responsible to periodically test the emergency preparedness and response procedure, where practical, and evaluate in conjunction with the Joint Health and Safety Committee.
5. Procedure	Facility Mangers are responsible for ensuring that contractors, either working on site or off site, report environmental incidents, as appropriate. The Facility Manager, in conjunction with the Contractor, fill out the Environmental Incident Report. If an environmental incident is an immediate threat to health or safety, pull the fire alarm to initiate an evacuation of the facility. Otherwise proceed as outlined as follows (only a few examples applicable to Waste Management Sectors are provided):

TABLE B.17 (CONT'D)
SAMPLE EMERGENCY RESPONSE PROCEDURE

5. Procedure	**Natural Gas Leak** **Facility Manager / EMS Project Coordinator / Municipality Personnel – Immediately sound fire alarm to evacuate the building / yard. Immediately notify Security of the natural gas leak.** Contact Director, Waste Management / Operations Manager **Security** – Notify gas company. **Municipality Personnel** - If possible, immediately shut valve for natural gas line. Notify Operations Manager / Sector Manager / Security. **Facility Manager** - If the natural gas was released outside the building immediately contact the Spills Action Centre and the City of (identify city). Follow up with a written report. Complete an Environmental Incident Report as soon as possible and no later than 48 hours after the release has occurred. Inform the Director, Waste Management as soon as possible. **Liquid or Solid Spill** **Municipal Personnel** - If a spill of liquid or solid material occurs due to an accident or a failure of a device, contain, control and clean up the spill (Reference policy outlining Spill Response Procedures). If the spill has entered a floor drain, a catchbasin, or migrated off the property, contact the Facility Manager immediately. **Facility Manager** - If notified that a spill has entered a floor drain, catchbasin or migrated off the property, contact the Director, Waste Management and the EMS Project Coordinator immediately. Complete an Environmental Incident Report as soon as possible and no later than 48 hours after the release has occurred. Forward to the EMS Project Coordinator. **EMS Project Coordinator** - If a significant quantity of material has entered a floor drain / catch basin contact the Spills Action Centre and the City of (specify city) and Regional Municipality of (specify Region). A significant quantity is defined as a quantity which will alter the quality of wastewater such that it exceeds the sewer use by-law criteria. Notify the Director, Waste Management if either the City of (specify city), the Regional Municipality of (specify municipality) (public works) and/or Spills Action Centre were contacted. **Noise** **Waste Management Division Personnel** - If noise is being emitted due to a mechanical problem or failure of a device, notify the Facility Manager immediately. If possible, repair or shut down the unit emitting the noise.

TABLE B.17 (CONT'D)
SAMPLE EMERGENCY RESPONSE PROCEDURE

	Facility Manager – Initiate procedure to repair the device emitting the noise. If the noise sources is located outdoors, complete an Environmental Incident Report as soon as possible, and no later than 48 hours after the noise concern was identified. Forward Report to the EMS Project Coordinator and Director, Waste Management. **EMS Project Coordinator and Director, Waste Management** - Respond to questions / noise complaints from adjacent property owners. Inform EMS Project Coordinator of any complaints received (if this has not been completed). **All Scenarios** **Waste Management Division Personnel** - Follow-up Environmental Incident Report to ensure all corrective actions have been completed. File Report. **EMS Project Coordinator** - Review Environmental Incident Reports semi-annually. Prepare a summary of environmental releases for the Manager, Waste Management to present to the Management Review Committee.
7. Approval _____ _____ _____ _____ Management Representative Date Director, Waste Management Date	
Next Revision: February 15, 2001 Revision Schedule: Annual Document Locations: Engineering	Author: John Smith, Environmental Coordinator Reviewed by: Jane Doe, Manager, Operations

TABLE B.18
SAMPLE ENVIRONMENTAL INCIDENT REPORT

DATE OCCURRED: DATE REPORTED:

IDENTIFY ENVIRONMENTAL INCIDENT

___ Air Emissions – specify

Odour from ___ Composting Operations ___ Landfill Operations ___ Other

Leaks from ___ Corrosive Gases ___ Flammable Gases ___ Nonflammable Gases
___ Other

c) Dust from ___ Composting Operations ___ Landfill Operations ___ Traffic
___ Other

___ Bomb Threat ____ Equipment / Vehicle Failure

___ Evacuation ____ Explosion

___ Fire - specify: Compressed Gas ___ Fuel ___ Garbage ___ Vehicle ___ Other ___

Leachate Break-out - Note: Record only if remedial action is required

___ Litter / Loose Debris ____ Natural Disaster ____ Power Failure

___ Spills / Uncontrolled Release (Liquids other than Leachate Breakout) – specify

- Nature of spilled material: ___ Flammable ___ Nonflammable ___ Toxic Materials
  ___ Other
- Source of Spill: ___ Equipment ___ Vehicle ___ Other
- Impact: ___ To Land ___ To Water

Other:_____

_____

In your own words, describe what happened:

Injury: No_____ Yes ____
If yes fill out Incident Report and attached a copy to this report.

TABLE B.18 (CONT'D)
SAMPLE ENVIRONMENTAL INCIDENT REPORT
DESCRIPTION OF ENVIRONMENTAL INCIDENTS

Review emergency response procedures. Consider what could be done to prevent the incident from occurring again and assess if the emergency response procedures are adequate.

What external resources were required to deal with the environmental incident?

Agency	Date	Time	Verbal/Written

What corrective action was taken prevent future similar incidents:

Date of implementation of corrective action:

Approval

Management Representative	Date	Director, Waste Management	Date

Next Revision: February 15, 2001
Revision Schedule: Annual
Document Locations: Engineering

Author: John Smith, EMS Coordinator
Reviewed by: Manager, Operations

TABLE B.19
SAMPLE PROCEDURE FOR A COMPLIANCE AUDIT

ISO 14001 Procedure - Element 4.5.1 - Monitoring and Measuring
Issue Date - February 15, 2000
Revision No. 1

1. Purpose	To document a procedure for environmental compliance audits to ensure that environmental regulatory requirements of the Waste Management Division are being met.
2. Scope	To ensure that a procedure for conducting period environmental audits has been put in place in the Waste Management Division.
3. General	Individuals who are independent of the process being audited must complete the environmental compliance audit. Include the documented procedure for environmental compliance audits in your Municipality's document control system.
4. Responsibility	The EMS Project Coordinator or Designate is responsible for ensuring that that an environmental compliance audit is periodically conducted and documented. Facility Managers are responsible for summarizing the information on their Department's environmental regulatory responsibilities. The EMS Project Coordinator is responsible for forwarding the findings of the Environmental Compliance Audit (and out of compliance findings) to the Director, Waste Management. The Facility Manager and the EMS Project Coordinator are responsible for preparing a corrective action plan to address non-compliance issues.
5. Procedure	1. Prepare a table outlining the Waste Management Division's regulatory requirements. The table should reference the following information: • listing of environmental regulatory issues and requirements; • applicable laws, regulations and permits; • significant due dates to submit reports and schedules; • dates of regulatory inspections; and • identification of the person / title responsible. 2. Prepare a checklist summarizing the Waste Management Division's environmental regulatory issues and requirements.

	3. Schedule the environmental compliance audit and assign the appropriate in-house personnel and/or retain an external contractor.

TABLE B.19 (CONT'D)
SAMPLE PROCEDURE FOR A COMPLIANCE AUDIT

	4. Establish a schedule to periodically audit the Waste Management Division's environmental regulatory issues and requirements. The audit should ensure that regulatory issues and requirements are being met by the appropriately designated personnel. 5. Summarize the findings of the Environmental Compliance Audit (including non-compliance issues). 6. Prepare a corrective action plan to address non-compliance issues.
6. Related Records	Schedule - : List of Documents, Location and Revision Schedule
7. Approval _____ _____ _____ _____ Management Representative Date Director, Waste Management Date	
Next Revision: February 15, 2001 Revision Schedule: Annual Document Locations: Engineering	Author: John Smith, Environmental Coordinator Reviewed by: Jane Doe, Manager, Operations

TABLE B.20
SAMPLE PROCEDURE FOR IDENTIFYING NONCONFORMANCE, AND TAKING CORRECTIVE AND PREVENTIVE ACTION

ISO 14001 Procedure - Element 4.5.2 - Nonconformance, Corrective and Preventive Action
Issue Date - February 15, 2000
Revision No. 1

1. Purpose	To ensure that there is a process to identify, document, analyze and non-conformances and implement preventive and corrective actions.
2. Scope	This procedure is for addressing incidents and potential incidences of nonconformance at waste management operations and taking preventive and corrective action.
3. General	Preventive and corrective actions are required to ensure that environmental risk is minimized and that adherence to the ISO 14001 standard is being maintained. There are two actions that are taken under this procedure: corrective action and preventive action. Corrective Action is taken after a problem or incident has occurred and Preventive Action is taken to prevent the occurrence.
4. Responsibility	The EMS Project Coordinator is responsible for implementing and maintaining this procedure.
5. Procedure	Corrective Action 1. A Corrective Action Notice (CAN) may be requested from the EMS Project Coordinator by any employee. The employee requesting the CAN is responsible for completing the form and bringing the problem to the attention of the EMS Project Coordinator. 2. The EMS Project Coordinator is responsible for reviewing the CAN and if he/she deems it has merit, assigning a tracking number and determining a schedule for responding to and resolving the CAN. 3. The EMS Project Coordinator is responsible for distributing copies of the CAN to the appropriate person for action. 4. The assigned person is responsible for resolving the problem and for communicating the solution to the EMS Project Coordinator and the employee that originally requested the CAN. 5. The EMS Project Coordinator is responsible for tracking the schedule of the CAN and reporting any overdue CAN to the Operations Manager on a weekly basis. 6. The EMS Project Coordinator is responsible for responding to the employee who requested the CAN.
6. Related Records	Schedule 4.5.2a - Corrective Action Notice Schedule 4.5.2b - Tracking Corrective Action Notices Schedule 4.5.2c - Preventive Action Notice Schedule 4.5.2d - Tracking Preventive Action Notice

TABLE B.20 (CONT'D)
SAMPLE PROCEDURE FOR NONCONFORMANCE, CORRECTIVE AND PREVENTIVE ACTION

7. Approval

Management Representative	Date	Director, Waste Management	Date

Next Revision: February 15, 2001
Revision Schedule: Annual

Author: John Smith, Environmental Coordinator
Reviewed by: Jane Doe, Operations Manager

TABLE B.21
SAMPLE NONCONFORMANCE REPORT

ISO 14001 Procedure - Element 4.5.2 - Nonconformance, Corrective and Preventive Action
Issue Date - February 15, 2000
Revision No. 1

Section 1: To be completed by observer of nonconformance / noncompliance.
Forward to direct Supervisor, EMS Project Coordinator.

Location:

Source where Nonconformance identified(Circle One Choice):

1. Internal Audit 2. External Audit 3. Observation

Observation / Description of nonconformance or noncompliance:

Reported by: _____ Received by: _____
Date: _____ Date: _____

Section 2 - To be completed by EMS Project Coordinator

ISO Standard: Element: Clause:

Documentation/Manual Reference:

Auditor: Lead Auditor: Date:

Category of Nonconformance: Major: Minor:

Section 3 - Root Cause Analysis, if appropriate:

TABLE B.21 (CONT'D)
SAMPLE NONCONFORMANCE REPORT
(Element 4.5.2)

Section 4 - Corrective Action

Step #:	Description	Employee	Target Completion Date:

Proposed Completion Date:
Date:

Responsibility:
Signature:

Sector Manager:

Date:

Section 5:. Approval

EMS Project Coordinator	Date	Director, Waste Management	Date

Next Revision: February 15, 2001
Revision Schedule: Annual
Document Locations: Engineering

Author: John Smith, Environmental Coordinator
Reviewed by: Jane Doe, Operations Manager

TABLE B.22
SAMPLE PROCEDURE FOR RECORDS MANAGEMENT

ISO 14001 Procedure - Element 4.5.3 - Record Management
Issue Date - February 15, 2000
Revision No. 1

1. Purpose	To ensure that environmental records are maintained in a manner that they are readily retrievable and protected against damage or loss.
2. Scope	This procedure is for control of records on various matters relating to environmental issues and the EMS.
3. General	Records are required so that the organization can demonstrate conformance to the ISO 14001 standard. These records include: • information on environmental laws • complaint records • training records • process and product information • inspection, maintenance and calibration records • incident reports, reports of non conformance and corrective and preventive action • records of significant environmental impacts • audit results (EMS audit reports) • management reviews • Registrar's reports and certification
4. Responsibility	The EMS Project Coordinator is responsible for ensuring that records are maintained in a manner consistent with the requirements of ISO 14001.
5. Procedure	Identification of Records Requiring Control 1. The EMS Project Coordinator shall prepare a list of records that require control and identify an appropriate storage location and retention time for each record. Maintenance of Records 1. The EMS Project Coordinator shall be responsible for: • ensuring that records are stored and maintained in a manner to ensure that they are readily retrievable and protected against damage. 2. ensuring that all records are clearly identified and dated. 3. destroying obsolete records. 4. If needed in his/her judgement, retaining copies of obsolete records. These documents must be clearly identified as "obsolete, retain for information purposes".
6. Related Records	Schedule 4.5.3a - Records Types, Location and Retention

TABLE B.22 (CONT'D) **SAMPLE PROCEDURE FOR RECORDS MANAGEMENT**	
7. Approval _____ _____ _____ _____ Management Representative Date Director, Waste Management Date	
Next Revision: February 15, 2001 Revision Schedule: Annual Document Locations: Engineering	Author: John Smith, Environmental Coordinator Reviewed by: Jane Doe, Manager, Operations

TABLE B.23
SAMPLE SCHEDULE FOR RECORD MANAGEMENT

Schedule 4.4.5a - List of Record Types, Location and Retention

RECORD TYPE	LOCATION	REVISION SCHEDULE	RETENTION*
Certificate of Approval (Air)	Environmental Records - Air Emissions	N/A	Retain as long as the equipment it relates to exists
Annual Reports	Environmental Records - Air Emissions	Annual	Retain for five years
Waste Generator Registration	Environmental Records - Hazardous Waste	When new waste classes are registered	Retain until it is revised or as long as valid
Waste Manifests	Environmental Records - Hazardous Waste	N/A	Retain for two years
Complaint/Occurrence Reports	Environmental Records	N/A	Retain for five years
Sewer Use Violation Notices	Environmental Records - Wastewater	N/A	Retain for five years
Sewer Use Agreements	Environmental Records - Wastewater	N/A	Retain as long as valid
Waste Audit Reports	Environmental Records - Waste	Annual	Retain for five years
Waste PCB Storage Site Approval	Environmental Records - Hazardous Waste	N/A	Retain as long as PCBs are stored on site
Spill Reports	Environmental Records	N/A	Retain for five years
Underground Storage Tank Records	Environmental Records - Chemical Storage	N/A	Retain for two years
Monitoring Data	Environmental Records - Monitoring	N/A	Retain for five years
Training Certificates	Human Resources Records - Training	As required	Retain valid training certificates for all existing employees
Maintenance Records	Engineering Records - Maintenance	N/A	Retain for five years

TABLE B.23 (CONT'D)
SAMPLE SCHEDULE FOR RECORD MANAGEMENT

RECORD TYPE	LOCATION	REVISION SCHEDULE	RETENTION*
Supplier and Contractor Agreements	Purchasing Records - Agreements	N/A	Retain as long as valid
Inspection Records	Engineering Records - Inspection	N/A	Retain for two years
Equipment Calibration Records	Engineering Records - Calibration	N/A	Retain for one year
Emergency Response Information	Environmental Records - Emergency Response	Annual	Retain for five years
Management Reviews	Environmental Records - Management Review	Annual	Retain for five years
Audit Results	Environmental Records - Audits	Annual	Retain for five years
Incident Reports	Environmental Records	N/A	Retain for two years
Hazard and Emergency Investigation Reports	Environmental Records	N/A	Retain for two years
Applicable Legislation or Other Requirements	Environmental Records - Legislation	Annual	Retain legislation as long as it is in effect

*Retention: Your municipality may wish to seek legal advice in defining retention times as it may be prudent to retain some records (e.g. legal documents, health and safety records) for indefinite periods of time.

TABLE B.24
SAMPLE PROCEDURE FOR ENVIRONMENTAL MANAGEMENT SYSTEM AUDIT

ISO 14001 Procedure - Element 4.5.4 - EMS Audit
Issue Date - February 15, 2000
Revision No. 1

1. Purpose	To ensure that the facility is conforming to the environmental management system and to ensure that the system has been properly implemented and is being maintained.
2. Scope	This procedure is for periodic environmental management systems audits to determine whether the system conforms to the requirements of the standard, that it has been properly implemented and maintained and provides information on the results of audits to the management.
3. General	Audits are required so that the organization can demonstrate conformance to the ISO 14001 standard. The audit programme should cover the following areas: • the activities and areas to be considered in audits • the frequency of audits • the responsibilities associated with managing and conducting audits • the communication of audit results • auditor competence
4. Responsibility	The EMS Project Coordinator is responsible for ensuring that the audits of the environmental management system are conducted.
5. Procedure	Development of Audit Program 1. The EMS Project Coordinator shall prepare an Audit Program including a checklist of items to be audited. Frequency of Audits 1. The EMS Project Coordinator shall conduct an internal audit of the environmental management system annually. 2. The EMS Project Coordinator shall arrange for an outside qualified/certified auditor to conduct an audit of the environmental management system every three years. 3. The EMS Project Coordinator shall ensure that the outside auditor is competent to complete the audit. Audit Responsibilities 1. The EMS Project Coordinator is responsible for summarizing and communicating the results of the audit to the Manager, Waste Management. 2. The EMS Project Coordinator is responsible for identifying action items from the audit and notifying the appropriate Department Managers of the action items.

TABLE B.24 (CONT'D)
SAMPLE PROCEDURE FOR ENVIRONMENTAL MANAGEMENT SYSTEM AUDIT

	3. The Facility Managers are responsible for resolving/rectifying action items in their facility. Where the facility does not have sufficient resources to rectify the item, the Facility Manager must inform the Operations Manager. 4. The allocation of additional resources is at the discretion of the Director of Waste Management. 5. Communication of Audit Findings 6. The EMS Project Coordinator shall identify all sensitive audit findings as "confidential". The dissemination of this information will be restricted to those involved in the rectification of the problem.
6.Related Records	Schedule 4.5.4a - Audit Programme Checklist Schedule 4.5.4b - Tracking of Action Items Annual Audits Summary of Annual Audits
7. Approval _____ _____ _____ _____ Management Representative Date Director, Waste Management Date	
Next Revision: February 15, 2001 Revision Schedule: Annual Document Locations: Engineering	Author: John Smith, Environmental Coordinator Reviewed by: Jane Doe, Manager, Operations

TABLE B.25

SAMPLE MANAGEMENT REVIEW RECORD

(Element 4.6)

1. Attendees:

2. Items Discussed:

3. Decisions Made:

4. Action Items (Include Specific Task Assignments and Due Dates):

Management Rep. Signature: Date:

Note: Action Items involving corrective action shall be documented on a corrective action report.

Approval

Management Representative	Date	Director, Waste Management	Date

Next Revision: February 15, 2001
Revision Schedule: Annual
Document Locations: Engineering

Author: John Smith, Environmental Coordinator
Reviewed by: Jane Doe, Manager, Operations

Appendix C: Life Cycle Inventory Model for Integrated Waste Management

A Life Cycle Inventory Tool for Integrated Solid Waste Management

Abstract

Two industry associations, whose mandates are to assist municipalities to develop sustainable waste management systems, have sponsored the development of a model to evaluate the environmental effects of waste management processes. The objective of the project is to provide Canadian municipalities with a tool that will enable them to evaluate the environmental performance of the various elements of their existing or proposed waste management systems based on the 'best information' currently available. This paper provides an outline of the model and discusses how the output of the model can be used to assist municipalities in the selection of system elements of an integrated waste management system.

Introduction

CSR: Corporations Supporting Recycling and the Environment and Plastics Industry Council (EPIC) are co-sponsoring the development of tools that Canadian municipalities can use to evaluate the environmental and economic effects of proposed changes to their waste management systems. This will help municipalities to identify waste management practices and strategies that best fit the individual municipalities' needs and priorities. The City of London in Ontario (a municipality with a population of approximately 330,000) was a co-participant in the development of the model. The City was used as the "test-case" for the model's initial development and for subsequent field testing and refining. The Steering Committee for the project includes representatives from Environment Canada and the Canadian Composting Council.

Why an ISWM Tool?

Since the mid-1980s municipal solid waste, and the environmental consequences associated with its management, has received a great deal of attention in industrialized countries. Societal pressures to reduce the amount of waste that needs to be managed has resulted in a large number of initiatives aimed at reducing packaging, and in the development of curbside recycling and organics diversion programs. A hierarchy of waste management practices which encouraged source reduction, reuse and recycling over energy recovery and disposal was developed and widely endorsed in most countries.

Over the last ten years, the majority of Canadian municipalities have incorporated the waste diversion strategies espoused by the hierarchy into their waste management systems. The hierarchy was an important advance in waste management thinking, in that it moved the focus

away from the use of a single waste disposal practice (which in the majority of cases was landfilling), towards a combination of practices aimed at resource conservation and environmental preferability.

The main shortcoming of the hierarchy is its basic premise that certain waste management practices are *always* environmentally preferred over others. In reality, the environmental performance of one waste management practice over another is a function of a number of site specific factors, including:

- ◊ the characteristics of the waste
- ◊ the efficiency of the waste collection systems required by different waste management practices
- ◊ the availability of markets for recovered materials
- ◊ the end use of the materials recovered from the waste stream
- ◊ the emission standards to which waste management facilities are designed and operated
- ◊ the cost effectiveness of the environmental protection obtained by different waste management practices.

There is a growing recognition that strict adherence to the hierarchy does not allow municipalities to optimize their waste management systems in a manner that is consistent with their specific needs and priorities. As a result, the concept of integrated solid waste management (ISWM) has developed. ISWM views the list of waste management practices as a menu of options rather than a strict hierarchy. Many different definitions of ISWM have been proposed. In general, ISWM is broadly accepted as being the application of two or more waste management practices to a range of different waste material types. The ISWM group of the International Energy Agency (IEA) has put forward the following definition1:

"An optimized system of waste management practices based on the sound evaluation of environmental, energy, economic and socio-political considerations which includes a combination of two or more components of the waste hierarchy".

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1 IEA Bioenergy, "Integrated Solid Waste Management, Infosheet No. 1: An Overview".

This definition requires the evaluation of the environmental, energy and economic effects of a waste management practice as a basis for optimising the system. To-date, municipal waste managers in Canada have not had access to tools for the comprehensive evaluation of these effects. The majority of tools that have been developed for the evaluation of waste management systems have focused exclusively on the financial implications of alternative waste management practices.

The Life Cycle Methodology

A Life Cycle Assessment (LCA) is an analytical tool for the evaluation of impacts over the entire life cycle of a product or process and on the environment as a whole. Waste management decisions can potentially impact a number of stages in the life cycle of a product, and cannot, therefore, be made in isolation. For example, recycling a package will reduce the quantity of virgin materials that must be extracted, and increase collection and waste processing requirements. Similarly, recovering energy from waste will reduce the amount of energy that must be produced by the combustion of fossil fuels. A holistic (or whole system) approach is therefore necessary to ensure that a reduction in an impact at one stage in a product's life cycle (for example, the disposal stage) is not achieved at the cost of an increase at another stage (say, the production stage).

The Life Cycle Assessment methodology consists of four stages:

1. Goal and Scope Definition which defines the purpose of the life cycle study, the system boundaries, and the depth and breadth of the study.

2. Life cycle inventory which quantifies the use of resources and the release of pollutants at each stage of the life cycle;

3. Life cycle impact assessment which combines the inventoried resource consumption and pollutant releases to provide a measure of the environmental performance of a product/process; and,

4. Interpretation, which provides guidance on the interpretation of the results of the life cycle inventory and/or the life cycle impact assessment.

This project has primarily been focused upon the first two stages of the methodology: goal scope and definition and life cycle inventory for which relatively well developed and standardized procedures are available. The interpretation stage can either be based on the results of the

inventory or on the results of the impact assessment. The project has developed environmental indicator descriptions and factors for the conversion of energy use and emission indicators into every day equivalents to assist in the interpretation phase. Due to the lack of consensus on impact assessment methodologies, only the following elements of the life cycle impact assessment have been incorporated:

◊ Individual life cycle burdens have been classified into effects categories: energy (resource depletion), greenhouse effect, acidification, smog, and toxic compounds. These environmental effects were identified during the goal and scope definition stage as being the main environmental effects of concern for waste management processes.

◊ Greenhouse gas emissions (CO2 and CH4) have been converted into equivalent tonnes of CO2 using the global warming potential (GWP) as the characterization factor.

The Project Approach

Early on in the project, it was recognized that in order to develop a tool that could be widely used by municipalities, the following would have to be achieved:

◊ the tools must be simple to use

◊ detailed guidance must be provided on the interpretation of model results

◊ the utility of the model must be tested in several municipalities

◊ training and support must be available

The development of the model was undertaken in two phases. In phase 1 of the project, the following tasks were completed:

◊ definition of the scope of the project, including the setting of life cycle study boundaries, the identification of waste materials/waste management processes to be modelled and the selection of environmental effects that would be evaluated;

◊ development of algorithms for determining the environmental burdens associated with each element of a waste management system: collection, transfer, recycling, composting, energy recovery and landfill;

◊ compilation of 'typical' system parameters (e.g. fuel consumption/tonne of waste collected, energy production/tonne of waste combusted, % residue in sorting operations, etc.) for use as

default values in instances where the user (e.g. waste manager) does not have access to data specific to the municipal system being evaluated;

◊ compilation of a data base containing emission factors associated with each unit operation in the waste management system (transportation, energy production, combustion, composting, landfilling, etc.) and compilation of limited preliminary data on the environmental burdens associated with reprocessing of recovered materials and burdens avoided through the use of recycled material.

The second phase of the project focused upon the development of guidance for the user on how to determine inputs to the model and on how to interpret model results. Specific tasks undertaken in Phase 2 include:

◊ addressing user issues, including the development of user friendly interfaces for the tools;

◊ the production of a user manual and an interpretation manual which include analysis of the sensitivity of the model to the major assumptions and data uncertainties;

◊ testing of the model at additional municipalities

Goal and Scope Definition

The model is designed to examine the effects of recycling, composting, energy recovery and landfilling of all the major waste materials in the municipal waste stream: paper, glass, ferrous materials, aluminum, plastics, food waste, yard waste and "other waste" (e.g. textiles, diapers, kitty litter, etc.).

The beginning, or cradle, of the life cycle of waste was defined as the point when materials are set out at the curb for collection. For materials that are recycled or composted, the system boundary extends to the point at which recycled material or compost is produced. For energy from waste systems, the boundary extends to the production of energy. In the case of landfilling, the boundary extends to the point at which the landfill becomes "environmentally inactive" (i.e. gas and leachate production ceases and only inert material remains). Because recovery processes such as recycling and energy recovery produce useful products/energy that can substitute conventional products/energy, the model treats these processes as having a dual function: a waste management function and a production function. This allows the waste management system to be 'credited' with the avoided environmental burdens associated with the production of the conventional material/energy that would otherwise have to be produced.

The following specific environmental parameters were selected for evaluation:

- ◊ energy consumption
- ◊ greenhouse gas emissions (CO2 and CH4)
- ◊ emissions of acid gases (NOx, SOx and HCl)
- ◊ emissions of smog precursors (NOx, PM-10, and non-methaneVOCs)
- ◊ air emissions of heavy metals (Pb, Cd, and Hg) and dioxins
- ◊ water emissions of heavy metals (Pb, Cd, and Hg), dioxins), and biochemical oxygen demand (BOD)
- ◊ residual solid waste.

The functional unit used in the model is the user specified quantity and composition of waste generated in a given study area.

The Model

The model is written in Excel 97and has a Visual Basic interface. The model has been structured so that it uses data specific to the user municipality to ensure applicability of the results and accuracy. At the same time, in order to allow the user the ability to run a 'first level' screening evaluation wherever possible, default values have been developed.

The starting point for the model is the municipality's existing waste generation, composition and waste flow data. Defaults are provided for waste composition. These can be overwritten if the user municipality has site-specific data available. Quantities of each material flowing to recycling, composting, energy from waste (EFW), and landfill are to be input by the user municipality.

Environmental burdens associated with each waste management option are then calculated by subsequent modules described below. The energy module and the transportation module calculate environmental burdens for elements that occur throughout the waste management system: energy consumption/production and transportation. Subsequent modules calculate burdens that are associated with specific waste management practices.

This energy module estimates the environmental burdens associated with the production, delivery and use of different forms of energy. Energy is consumed throughout the waste management system for transportation, material handling and processing. The production, delivery and use of this energy is the major source of a number of the pollutants considered in this study.

Electricity, which is used in a number of waste management functions, represents an energy source derived from a number of different fuels. Emission factors for the generation of electricity must reflect the different methods of power generation used (fossil fuel combustion, nuclear, hydroelectric).

This collection transportation and transfer module calculates the environmental burdens associated with the collection of recyclables, compostables and garbage; the transportation of materials recovered at the MRF to markets, the transportation of MRF and compost residues to landfill or EFW; and, the transportation of ash from EFW to landfill. The user is asked to input the distance travelled by collection and transportation trucks, the diesel consumption per kilometre and whether the different waste streams are routed through a transfer station. Defaults are provided for system parameters such as fuel consumption for diesel trucks during collection and transportation, energy consumption of transfer stations, etc.

The Materials Recovery Facility (MRF) module calculates the environmental burdens associated with MRF activities. These are a function essentially of the energy consumption, which is, in turn, dictated by the extent of mechanization. Major energy consuming items of equipment used in MRFs are ferrous magnets, eddy current separators, and air classifiers. The user municipality is required to either input energy consumed per tonne of material processed at the MRF and the split between electrical energy and natural gas or use default values provided by the model.

MRF residues must be managed by either landfilling or energy recovery. The user is required to input the percentage residue and the management method. A default value of 5% residue is provided.

The Recovered Materials Reprocessing module calculates the environmental burdens associated with the processing that recovered materials have to undergo in order to be usable as substitutes for virgin materials (de-inking, re-pulping, de-tinning, etc.). This module also attempts to quantify the burdens avoided as a result of displacing virgin material ('offset burdens' or 'virgin material displacement credits'). The output of this module will likely remain a secondary source

of information as it relates to activities outside the jurisdiction of the municipality and for which reliable data is only beginning to be developed. This module requires no input from the user.

The Composting Module calculates the environmental burdens associated with composting organic materials. The user municipality is required to input the composition of the organics collected for composting (% leaves, grass and brush). Facility specific energy consumption data can be input, or the default values developed for windrow and in-vessel composting can be used.

The Energy from Waste Module calculates the environmental burdens associated with recovering energy from a specified quantity of waste, based on the composition of the waste (and therefore its heat and carbon content), and data on emissions to air and water and concentrations of contaminants in solid residues. The analysis of the environmental burdens of EFW facilities takes into account the conventional energy production emissions that are displaced. Displaced energy consumption/emissions are calculated using unit energy consumption and emission factors obtained from the energy module.

The Landfill Module calculates the environmental burdens associated with landfilling the quantity of waste specified by the user, based on the composition of the waste, the energy consumed in landfilling operations and data on the quantities and chemical composition of input MSW, landfill gas and landfill leachate. The user is also asked to input whether the landfill has a gas collection system, whether the energy is recovered from the gas, whether the landfill is lined and whether leachate is collected and treated.

Environmental burdens from landfilling include dust emissions from landfilling operations, landfill gas from the biodegradation of the waste in the landfill and landfill leachate from the percolation of moisture through the landfilled waste.

Interpretation of Model Results

To aid municipalities in the interpretation of the inventory results produced by the model, the project provides:

◊ a description of the environmental parameters evaluated by the model, their significance and the major sources of these pollutants;

◊ conversion factors or 'impact equivalents' that have been developed to allow the user to convert the inventory results into every day equivalents, such as the number of passenger cars releasing an equivalent quantity of emissions, etc.;

◊ a discussion of the key factors and assumptions that influence the results.

Conclusions

Environmental analysis of waste management systems using the life cycle methodology can provide important additional information for municipal waste management decision making. The life cycle inventory model developed in this project can be used to:

- help municipalities establish the baseline environmental performance profile of their waste management system against which emission reduction targets for pollutants such as greenhouse gas emissions can be measured
- determine the environmental effects of proposed system changes,
- undertake cost benefit analysis of proposed capital expenditures (e.g. landfill gas collection systems, transfer stations, organics diversion programs, etc.)
- assist in the development of environmental performance indicators for a municipalities overall environmental management system
- assist municipalities in State of the Environment reporting.

Further Information

For further information on the IWM Model contact:

Joseph P. Hruska, CSR at 416 594 3456 or, Catherine Cirko, EPIC at 905 678 7405

APPENDIX D: Implementation Strategy

Implementation Strategy for the

Guide To ISO 14001 Implementation Guide in the Municipal Waste Management Sector

The municipal and private sector partners who participated in the development of this Guide are expected to be the key players in disseminating information on the Guide and promoting the implementation of ISO 14001 consistent environmental management systems in municipalities.

It is proposed that a two-prong implementation strategy be adopted:

1. Couple the promotion of the Guide and training on ISO 14001 with other existing programs of the funding partners.

2. Validate the Guide by using it to implement an ISO 14001 consistent EMS for the waste management systems in one or more of the municipalities that have participated in the development of the Guide.

The two private sector partners on this project (CSR: Corporations Supporting Recycling and the Environment and Plastics Industry Council (EPIC)) have the mandate to assist municipalities to develop environmentally sound and economically sustainable waste management systems. Both organizations have been part of the Ontario recycling and waste management system for more than a decade. They have undertaken a number of projects designed to assist municipalities to develop efficient waste management systems, and thereby ensure that residential waste is managed at the lowest possible cost to the environment and the consumer. CSR is a member of the newly formed Waste Diversion Organization (WDO).

CSR and EPIC have funded a project for the development of an Integrated Waste Management (IWM) model for the evaluation of the environmental aspects of municipal waste management systems. A number of the municipal partners on this project are also involved in the development of the model. The IWM model uses a life cycle approach to profile energy consumption and emissions of major pollutants. Activities considered in the model are the collection and transportation of waste, the sorting and reprocessing of recyclables, the composting of organics, the recovery of energy through the combustion of waste, and, the landfilling of waste (with and without gas collection and utilization). The City of London provided key input throughout the model development and was the first test case for the model. The IWM model forms an integral part of London's Continuous Improvement System. Case studies using the IWM model are currently being run at the Town of Markham and the Region of Hamilton Wenthworth.

CSR and EPIC have developed a Business Plan (a copy of which is attached) for rolling out the model to municipalities. It is suggested that this Business Plan be expanded to include the dissemination of information on the Guide and training on the implementation of an ISO 14001 consistent environmental management system. Training workshops to familiarize municipalities with the IWM model form a major element of the Business Plan. A session outlining the benefits of ISO 14001 and stepping the user through the information provided in the Guide could be added to these workshops. To date, workshops have been held in the London, Calgary, and Halifax through the sponsorship of CSR, EPIC and Environment Canada. Ontario municipalities attending the workshop held in London on October 29, 1999 included Barrie, Guelph, London, Peel, and Hamilton-Wenthworth. At this workshop, municipalities were updated on the status of the ISI 14001 Implementation Guide.

Discussions are underway to hold a workshop for the Association of Municipal Recycling Coordinators (AMRC). Also, the City of Ottawa has expressed an interest in hosting a training workshop on the IWM model. It is recommended that a Needs Assessment be undertaken to determine whether additional workshops are required. It is expected that if a formula for funding additional workshops can be worked out, a number of other municipalities would be interested in attending workshops that combined training on the IWM model with that on ISO 14001.

All three partner municipalities (City of London, Town of Markham and Region of Peel) have expressed an interest in implementing an ISO 14001 consistent EMS for their waste management systems. It proposed that these municipalities be approached and requested to participate in a project to validate of the Guide, by following the guidance contained in the Guide to implement and ISO 14001 EMS. To assist a candidate municipality to obtain approval from Senior Management and Council to participate in a validation project, it is proposed that discussions be initiated between the Ministry of Environment and other partners on the resources (financial, technical and advisory) that the partners can make available to the project.

CSR & EPIC
Integrated Solid Waste Management Planning Tool

CSR Marketing & Business Plan

1.0 Background

CSR and EPIC have jointly invested approximately more than $175,000 in the development of a municipal planning tool over the past two years. The tool is designed to help municipal waste managers to optimize their current waste management systems and to identify the corresponding economic and environmental effects of potential changes to these systems.

The project has relied on primary research from a number of international sources (e.g. for information on the lifecycle burdens of managing different waste streams through various treatment options). It has received widespread attention because of its emphasis on producing a user–friendly tool for integrated solid waste management planning and program evaluation. The work is also very topical since it helps a municipality to cost out and analyze the greenhouse gas and energy reduction benefits of various waste diversion activities and plans.

To date, the tool has been field tested in the city of London Ontario. A peer review process (jointly funded by CSR, EPIC and Environment Canada) is underway involving a small panel of international experts. At present, two additional Ontario communities (Markham and Barrie – CSR's two other partnership communities) are planning to apply the tool to their programs in 1999.

This project is important to CSR for three main reasons:

- First, it is a key project in terms of CSR's stated mission - to take a leadership role in identifying environmentally sound, cost effective waste management solutions and to work in partnership with other industries, governments and consumers to implement these solutions. The tool is both leading–edge and solutions oriented.

- Secondly, this project is the most explicit integrated solid waste management planning activity within the organization. ISWM is an important area for CSR and its member companies since it is the cornerstone of CSR's first principle regarding environmentally and economically sustainable approaches to waste management – that

the full range of wastes and treatment options must be considered in planning a community's waste management system through fact based decision making.

- Thirdly, this project is important to CSR as a contribution to international research and activity in the area of life cycle assessment. CSR (and EPIC) bring to this activity (and to the field) a uniquely practical, user-friendly approach to the issue of ISWM planning. Working through organizations such as the Canadian Council for International Business and the Organization for Economic Cooperation and Development (OECD), CSR and its partners in this project are advancing the optimization (rather than the maximization) of waste diversion activities in Canada and internationally.

2.0 Goals and Objectives

As noted above, CSR plans to work with its other two partnership communities – Markham and Barrie – early in 1999 (i.e. once the peer review process is completed) to apply the Municipal ISWM Tool (and the lessons learned from the London pilot) in these communities.

CSR and EPIC are also both being approached to support the tool's availability and application in other parts of Ontario, Canada and internationally. Our plan to address this request is as follows:

- CSR will serve as the primary "home" for the ISWM tool and will distribute the tool (i.e. in disc form and with the accompanying manuals with cost recover with full cost recovery, but not including development costs already borne by the partners) to any municipality and research organization that requests the information. The estimated cost is approximately $300 per disc/manuals (this price does not include supplementary technical support). **A possible requirement for purchasers of the tool could be "mandatory training" and/or contracting of Envirosphere for technical advice for two hours time maximum. The partners in the project believe some training and support is required.**

- CSR (in partnership with EPIC, Environment Canada, MOEE in Ontario and SWANA) will sponsor a one-day training session on the tool with selected Ontario municipalities as pilot participants. Potential role out beyond the pilot will be decided by the sponsors after the pilot, but CSR anticipates that further training will be provided on a commercial basis by SWANA (and /or other interested sponsors)

- The distribution of the disc and manual outside of Ontario will be on an "as requested " basis – i.e. CSR (and EPIC) will announce the availability of

the material through presentations, articles and their web sites, but CSR will not undertake and aggressive marketing program outside Canada as it is anticipated that "word of mouth" distribution will lead to a satisfactory diffusion of the tool

- CSR (with the possible support of interested partners such as EPIC, Environment Canada and/or MOEE) will be responsible for annually updating the ISWM tool (through a contract with Envirosphere) and for informing those who have received copies of the availability of updated versions. CSR and EPIC will also notify interested parties that technical support for applying the tool is available on a "fee for service basis" from Envirosphere. CSR and EPIC, on a case by case basis, might also provide start up technical support for Canadian municipalities that purchase and begin to apply the tool through the planned training course.

During 1999, it is anticipated that:

- 15 Ontario municipalities will be trained in the application of the tool
- the tool will have been distributed to an additional 5 Canadian municipalities outside Ontario
- the tool will have been distributed to an additional 20 municipalities/research organizations outside Canada
- ten presentations/articles will have been made/written by CSR and/or EPIC on the tool domestically and internationally

3.0 Roll-Out Program and Key Activities

Must have these elements to effectively utilize the tool and promote ISWM

1. Complete peer review and Version 1.0 so distribution and training can start.
2. Training programs for municipal managers
3. Promotion of the tool with other non-industry partners and government to help give credibility
4. CSR will be the primary "home" for the tool to ensure ongoing maintenance and future development of the tool – the EPIC/CSR ISWM Tool Committee should continue its partnership and activities.
5. CSR will investigate putting information on its web-site.
6. Main technical resources – R. Mirza, Envirosphere
7. Secondary technical resources – Peer Review Group, Peter White & P&G Life Cycle and other organizations studying issue – US EPA, UK DOE, Env. Canada Raw Materials Database home, other practioners

4.2 Complete Version 1.0

- **Timing, Budget & Objectives:**
  - **Peer Review:**
    - Timing – start now Oct 98
    - Budget – estimate $35,000 split the following way:
      - EPIC $10,000
      - Environment Canada $15,000
      - CSR $10,000
    - Objective – Impartial review of the tool to build its credibility and acceptance by users and ISWM practioners.
  - **Industry Presentations:**
    - Timing – start now Oct 98 to set date, organize format and presentations and procedures
    - Budget – cost $4,000 split the following way:
      - EPIC $2,000
      - CSR $2,000
      - estimate one day presentation with one day prep to send out disk and manuals, six ½ day individual presentations to materials group
    - Objective: inform industry players and build support for ISWM approach and to provide the peer review committee with industry comments.
  - **MOE Presentation**
    - Timing – T.B.D. (MOE Presentation requested by Keith West)
    - Budget – $575
    - Objective – build support for tools use and ISWM approach (i.e. policy objectives)

4.2 Training Issues for Municipalities (Plan attached Appendix A)

- Timing – Late Spring 1999 launch pilot
- Budget – Estimate per workshop $16,000 to $18,000
  - Design $6,000
  - Delivery $12,000
- Objective: Ensure proper usage and support programs for municipal managers & planners; promote the tools usage in planning and changes to municipal programs
- Partners: SWANA has already been approached by CSR. Environment Canada, EPIC and possibly key local or

regional organizations (e.g. Ontario MOE and SWANA Regional Committees across Canada)

- Workshops outside of Ontario are being considered by some partners (SWANA and Environment Canada)

4.2 Partners Promotion of Tool

- Expect "home" to promote tools use in an ISWM approach
- Broaden exposure to Canada and with key industry groups of like mind domestically and internationally
- Use technical case studies, articles and speaking engagements
- Piggyback on energy and global warming issue to highlight need and utility of model
- Exchange of information with other practitioners and organizations to improve science and usage of tools and link to ISO 14000 programs (i.e. tool produced within ISO 14000 standards)

4.2 CSR Home for the ISWM Tool in 1999

- **Budget Tool Maintenance-** $10,000 per year
  - CSR Share $5,000
  - EPIC Share $5,000
- CSR staff support as "Home" – 5% of Hruska's time for management of tool, training, committee work and partnership communities; Love, RIS retainer to support CSR home; Bonner and Lane at CSR as administrative support (database and tracking of distributed copies, distribution) would be a minimal change from current levels of support; Website update to be done internally at CSR.
- **Objective –**
  - CSR over the next 12 to 18 months be the "transitional home" for the ISWM Tool with an assessment after 12 months for transferring the tool to an ideal "third party"
  - CSR along with EPIC ensure proper maintenance for the tool during transition;
  - As the need arises, the committee housed in CSR will ensure future development of the ISWM Tool relevant to ISWM Systems such as:
    - Source reduction module
    - Deposit return module
    - Co-collection module
    - Module compatibility between environmental and economic modules
    - **Note: Funding and implementation of any of the above projects will require funding partners**

and/or interested parties willing to provide resources to implement the above modules.

- Ensure credible and proper technical advice is available

➢ **Principles –**

- ➢ Ownership is held by EPIC and CSR
- ➢ CSR, EPIC, London, Environment Canada remain involved and have a say in the models use and promotion;
- ➢ a multi-stakeholder group made up of government(municipal, provincial and federal) and industry – could expand to parties such as US EPA and other credible international groups
- ➢ political reps municipal or federal
- ➢ Further move to ISWM Systems and planning approaches such as Municipal Materials Flow Assessment approach

3.5 Main Technical Resource

- ➢ R. Mirza, Envirosphere
- ➢ For CSR becomes part of CSR technical team on the environmental impact and use of the tool
- ➢ Recommended main technical resource if home outside of CSR
- ➢ Main technical resource for purchasers of tool and training programs

4.2 Costs and Project Partners – What will these activities cost in 1999

4.2 Year 1999

- CSR time/labour costs – 5% of J. Hruska's time (Bonner/Lane current support) for tool management, training support, steering committee work, partnership communities, web-site etc. and four hours per month as part of RIS retainer to CSR in support of these activities
- $10,000 for tool maintenance and updating by CSR and EPIC as a contract to Envirosphere
- $20,000 for the tool's application in Markham and Barrie (as part of partnership funding – CSR will also ensure that the tool is profiled as part of the R2000 project with the city of Markham)
- $18,000 for development and delivery of a pilot training program for Ontario municipalities by CSR, SWANA, EPIC and Environment Canada and other partners to be determined.
- Implementation of ISO 14000 program for municipalities through Training Program
- $575 MOEE Presentation

4.2 Year 2000

- By the end of the fourth quarter of 1999, CSR will evaluate the success of the training and distribution plan for the tool and will determine CSR commitment (i.e. beyond an end of 1999 updating contract with Envirospere) to continue to house the tool within CSR into the year 2000. If CSR decides not to become the "permanent " home for the tool, the organization will endeavor to house the tool within a training organization (e.g. SWANA) or at a Canadian university/research organization or appropriate "third party".

Appendix A

CSR: Corporations Supporting Recycling

Integrated Solid Waste Management

Workshop Needs Assessment Report
&
Proposed Workshop

Prepared By RIS LTD

March 1998

1.0 Integrated Solid Waste Management Workshop Needs Assessment Report

1.1 Background

RIS was contracted by CSR in March 1998 to conduct a needs assessment to determine potential interest in an Integrated Solid Waste Management (ISWM) Workshop to support the dissemination of CSR/EPIC's ISWM tool. The needs assessment was intended to determine the need for a workshop, and to gather input and feedback regarding the design of the proposed workshop, ensuring that any resulting workshop will be as useful as possible to participants. This report describes the methodology, results and recommendations of the needs assessments.

A total of 16 telephone interviews were conducted with Commissioners and Directors of Public Works and Environmental Services within the major regional municipalities in Ontario.

The objective of the needs assessments was to determine:

a) the status of integrated solid waste management in the municipality (i.e. is it a "hot" topic? what are current issues vis-a-vis ISWM?)
b) support for the idea of an Integrated Solid Waste Management Workshop
c) suggestions as to how to make the proposed workshop as useful/relevant as possible
d) the appropriate target audience for the workshop
e) preferred timing of the workshop and length of workshop

A question was also asked to determine if the individuals/municipalities interviewed would be capable of running the computer model (the ISWM tool) on their existing computer hardware.

A final question assessed reaction to a proposed fall symposium on integrated solid waste management. The symposium was described to interviewees as an international forum, designed more for information transfer and exchange of approaches to ISWM, versus the workshop which would be a more hands-on guide to the ISWM Tool.

1.2 Recommendations Regarding an Integrated Solid Waste Management Workshop

Based on the needs assessment interviews, there is an identified need for one or more ISWM Workshops in Ontario. The primary purpose of these workshops would be support and dissemination of the ISWM Tool developed by CSR/EPIC. Respondents indicated a strong interest in learning the assumptions the tool is based on, learning the results in the communities in which it has been tested, and

being given the opportunity to apply the model to their own circumstances. Several interviewees even suggested that the tool be sent out in advance of the workshop, so participants could come to the workshop, somewhat familiar with the tool, and prepared to ask questions and discuss ISWM.

During 1998/99, two to three ISWM Workshops could be designed and delivered for an estimated cost of between $ 16,000-18,000 per workshop ($6,000+ for design and $10,000+for delivery) (including expenses, but not taxes). This is assuming that the CSR/EPIC Tool forms the core of the workshop.

Respondents were split on the issue of timing of a workshop. Roughly half of those intereviewed indicated a preference for a workshop sooner (i.e. spring) rather than later (i.e. fall) as they are in the midst of planning their future waste management strategies now. The remaining interviewees were content with the idea of a workshop in the fall.

1.3 Needs Assessment Findings Regarding an ISWM Workshop

In general, strong interest was expressed in the idea of an ISWM Workshop. Two people expressed qualified support (i.e. with some reservation), and two respondents did not support the workshop idea (for reasons expressed below).

Reasoning expressed by those who indicated strong interest in the proposed workshop included:

- Restructuring has provided the ideal opportunity to integrate - Kingston now has the size to achieve some synergy. Departments (e.g. waste management) are now considered "business units", and will embark on a business planning exercise in early fall to determine what services will be offered, by whom and how (Kingston)
- The timing is good as the Region is currently in the midst of a solid waste management strategy — looking at co-collection, wet/dry, increasing diversion, etc. (Region of Halton)
- The accountants are looking at the economic downsides of recycling and think it may not make financial sense at this point; resolution of this question (the cost of recycling) would be helpful (City of Windsor)
- It would be interesting to determine the impacts of converting to a wet/dry system similar to Guelph (Region of York)
- It would be interesting to assess the impact of 3-stream collection in other municipalities in the Essex-Windsor Region, as well as to assess the environmental and economic impacts of cutting our recycling program (Essex-Windsor)

Those who expressed *qualified* support, expressed the following reservations:

- ISWM is very important to consider, however is it a tangible enough concept for politicians who look at hard costs? (versus projected savings from emissions) (Region of Niagara)
- A computer model must be customized for a municipality in order to be useful - the likelihood of a generic model relating to my situation is slim. (Region of York)

Those who were not supportive of the workshop idea gave the following reasons:

- In Region of Durham, there is little political interest in single-tier waste management, which makes ISWM a desirable but distant proposition. In addition, most Durham municipalities contract services out and the required information for input into such a tool would not be available. CSR should encourage the province to make the upper tiers responsible for all waste management.

- Region of Sudbury expressed interest in attending such a workshop, although he is also somewhat constrained by restricted authority. They indicated that ISWM was a much more relevant topic in Sudbury last year when the Region attempted to take over curbside residential garbage collection. The attempt was unsuccessful and staff aren't pursuing the idea for now. (Region of Sudbury)

- Essex-Windsor had already attended a workshop delivered by P&R so they are familiar with the tool. They had also attended a 3-day course on ISWM by SWANA so they are very familiar with the topic. Although a workshop would not be of interest to them, they would be interested in plugging their own data into the tool in order to see the results. Essex-Windsor would be interested in doing this one-on-one with a representative from CSR. (Essex-Windsor)

1.4 Suggestions to Incorporate in the Design of Proposed Workshop

According to potential participants, either the tool or the workshop would ideally address:

- a general update on what's going on in ISWM
- the REAL costs of the existing waste management system in any community and can you compare these costs across municipalities
- economic impacts (apparently previous venues did not address economics)
- the assumptions made by the tool
- implement municipal assessment process within ISO 14000 standards
- the results from London (and Peel benchmarking exercise?)
- the results from how the tool has been applied (London), including reaction to the tool from politicians and the public
- a foreign example of how the tool has been applied (if this has been done)
- playing with the tool and inputting own data

- impacts on greenhouse gases, as municipalities will soon become more conscious of this
- quantifying the value of landfill space in the future (what's environmental value of preserving landfill space now)

Other Suggestions:

- send out a demo disk so they can test it out, maybe plug in some of their own data before the workshop so they can come prepared to discuss and ask questions
- customize the application for a Guelph wet/dry system and demonstrate it at the workshop (note that a capacity to evaluate a wet/dry scenario was mentioned by several people)
- ensure that the tool addresses:
  - a mix of urban and rural demographics
  - varied accessibility to markets
  - export of waste
  - HHW and reuse

1.5 Target Audience

In most cases, the individual interviewed (i.e. Commissioner/Director of Public Works and Environmental Services) was the appropriate audience for the workshop, and indicated interest in being invited to any future workshops.

Other personnel that respondents indicated might be invited included:

- superintendents
- environmental managers
- waste or landfill managers
- recycling coordinators, and
- those working on waste management strategies (e.g. from planning)

Several people indicated interest in sending politicians or members of public liaison committees in order to get a different perspective.

1.6 Length and Timing of Proposed Workshop

There was general agreement among respondents that such a workshop could be delivered in one day.

Respondents were split on the issue of workshop timing. Roughly half of the individuals interviewed expressed a need for this type of workshop as soon as possible (i.e. spring of 1998). The remaining individuals (i.e. those who see this more as an interesting exercise than as a planning tool) were comfortable with a workshop delivered in the fall of 1998.

Due to the lengthy peer review and development process for the tool, we do not expect to be ready to run workshops until spring 1999.

1.7 Note re: computer platform

All respondents operate on Windows platforms.

1.8 Note re: interest expressed in symposium on ISWM

Moderate or mixed interest was expressed in the idea of a symposium on ISWM.

Comments of interest included:

- I rely on SWANA to provide information on this topic
- Municipal questioning of CSR's motivation in hosting such an event. Is ISWM a vehicle for promoting user pay? What is CSR's agenda?
- Sounding like the RCO conference - need to avoid duplication
- Some interest in international ISWM experiences, but likely not relevant to Ontario communities
- An international forum would be good - we don't get much international exposure

1.9 Potential Integrated Solid Waste Management Workshop Agenda/Outline

9:30-10:00 Welcome & Introductions

10:00-11:00 Defining ISWM
Participants play "Dictionary". Individuals compose definitions for ISWM, then drawing on this input, each group comes up with a single definition for ISWM they are happy with. Each group's definition is posted, and individuals vote for the definition they feel best describes ISWM.

Facilitator then leads a discussion regarding ISWM and the previous exercise, which will probe the areas of consensus/dissent amongst the groups, address the boundaries and benefits of ISWM, examples of ISWM that fit within the definition, etc.

11:00-11:30 The Status of ISWM

Facilitator presents a snappy overview of what's happening world-wide in the name of ISWM. Presentation will address both ISWM tools (models, theories, etc.) and practical examples or case studies of communities with ISWM.

11:30-12:00 The CSR/EPIC ISWM Tool — Design
- What is the tool? What is it intended to do?
- What are the inputs, outputs and assumptions?

12:00-1:00 LUNCH

1:00-2:00 The CSR/EPIC ISWM Tool — Testing
- How has the tool been used (London case study)
- How does the tool fit into a planning process

2:00-3:00 The CSR/EPIC ISWM Tool — Demonstration
- Ruksana demonstrates the impacts of switching from 2 stream recyclables + garbage to a wet/dry scenario (this demonstration should be as realistic as possible i.e. using data from a real community)

3:00-4:30 The CSR/EPIC ISWM Tool — Application*
- In groups, participants are given the opportunity to play with the tool, inputting data from a scenario they create or are given (the intent here is not to get output for their own situation, but to understand the capabilities and limitations of the tool).

4:30-5:00 The CSR/EPIC ISWM Tool — Feedback and Next Steps

- The facilitator debriefs the previous session, focusing on:
  - suggested improvements to the tool
  - next steps if participants are interested in using the tool

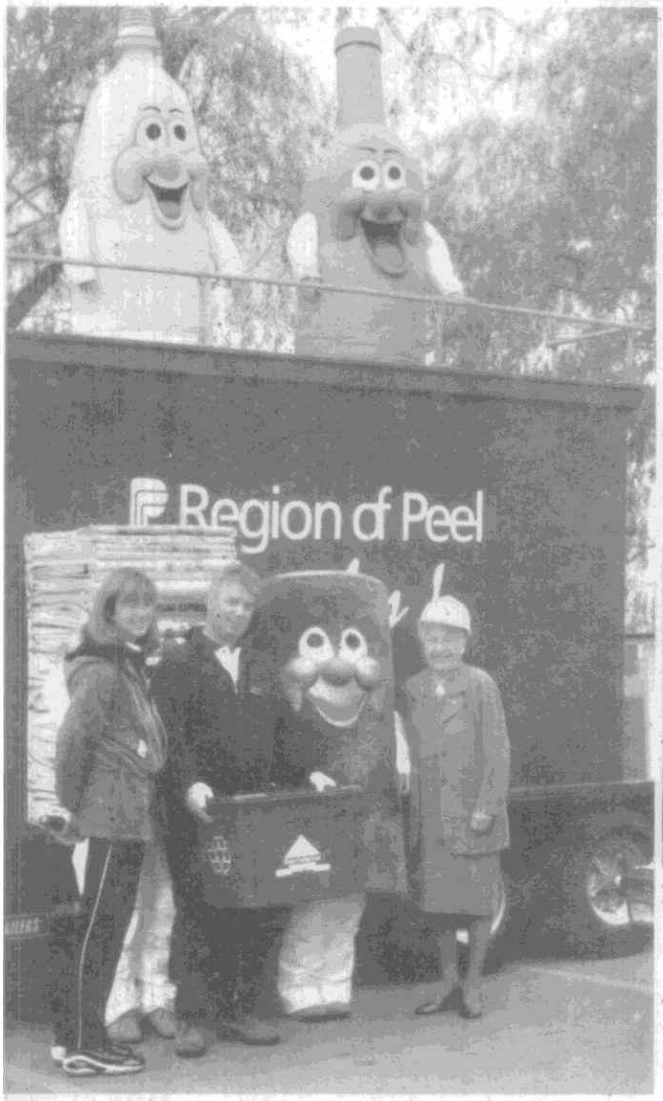
*Note: This agenda assumes that it would be feasible to have participants applying the tool directly in the classroom. How realistic this proposition is must be assessed by seeing the tool in operation.

Alternative Agenda

An alternative agenda option would be to send the tool out in advance to participants, allowing them to become familiar with the tool, coming to the workshop prepared to discuss and ask questions. A modified agenda would be required in this case.

Various Municipal Waste Management Facilities

Waterloo



Waterloo

Peel